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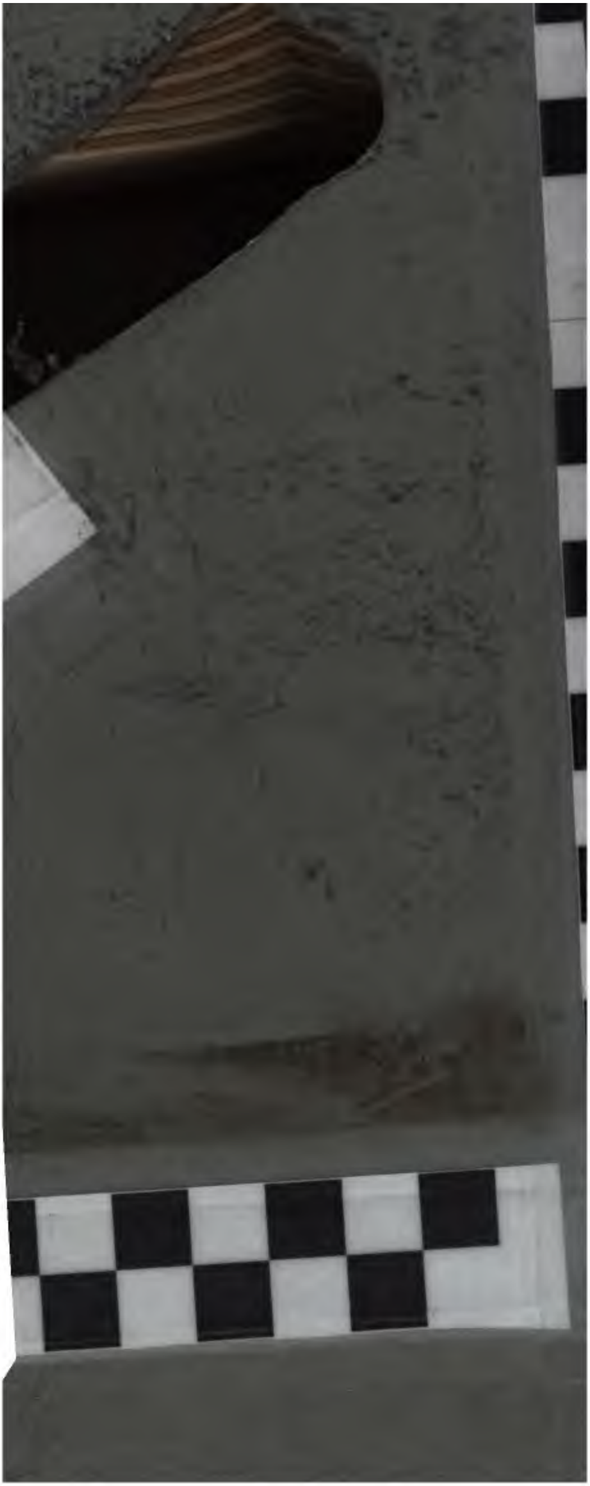

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PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

VOL. XIX.

SESSION 1874–75.

Nos. I. to VII.

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OF

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[PUBLISHED JANUARY 16TH, 1875.]

SESSION 1874–75.

First Meeting, 10th November, 1874.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*John Booth, Esq.; John Thomas Edmonds, Esq.; Major John G. Forbes,* R.E.; *William Frith, Esq.*

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DONATIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF JUNE 15TH, 1874.—525 sheets of the Ordnance Surveys. (*First Commissioner of Works*, through Major-General Sir H. James.) 160 sheets of Indian Surveys. (*Secretary of State for India.*) 24 sheets of Admiralty Charts. (*Hydrographic Office.*) 4 sheets of Government Geological Map of Sweden. (*M. Otto Torell.*) 4 Parts of Adolf Stieler's Hand-Atlas, and 2 Parts of Spruner's Hand-Atlas. (*Justus Perthes.*) The English Pilot in the Mediterranean Sea; 1677. (*Capt. A. L. Mansell*, R.N.) Atlas of the Russian Empire in Europe and Asia; 1770–80. (*Mr. Stefan Poles.*) 161 sheets of various

Maps of the European Kingdoms, and an Atlas consisting of 9 odd Maps. (*Lord Arthur Russell*, M.P.) Two Maps of Western Australia. (*Secretary of State for the Colonies.*) 10 sheets of Scheda's large Map of Central Europe. (*Imperial Military Geographical Institute, Vienna.*) 8 Maps published by the United States Geological and Geographical Survey of the Territories. (*Prof. Hayden.*) 16 Maps from Petermann's 'Mittheilungen.' (*Dr. Petermann.*) Map of the Province of Lambayeque, Peru, and Plan of the Railway to Eten. (*Don Jose Antonio E. Garcia.*) Colton's Map of Florida. (*Edward Power, Esq.*) Map of the Sun-On District, China. (*Dr. Kane.*) Facsimile of ancient Map of Bermudas; 1626. (*General Lefroy*, through Mr. Major.) Native Plan of the City of Nanking. (*Clement Allen, Esq.*)

The PRESIDENT opened the Session with the following Address:—

Fellows of the Royal Geographical Society,—Having been summoned by your votes at the last Anniversary Meeting to resume the direction of your affairs, I now proceed, for the fourth time, to address you at the opening of our Annual Session. I could have wished, in the interests of the Society, that the accomplished gentleman who last year presided over your counsels, and under whose direction your affairs reached a condition of unexampled prosperity, had found it to be consistent with the other calls upon his time and attention, to continue to occupy the Presidential Chair. Combining, as he did, a peculiar courtesy of manner and geniality of disposition with extensive knowledge and sound judgment, and possessing also a large practical experience as a traveller, and a life-long familiarity with command, he seemed especially fitted to preside over the Geographers of England, and I should thus have augured from his continued management, in cordial co-operation with an industrious and thoroughly efficient staff and Council, a brilliant future for this great Society, assured, as we should have been, of a steady increase in our means, our numbers, our reputation, and our power of usefulness. Under present circumstances we have not, perhaps, the same guarantee of success, but still, when I look around and see evidence on every side of unabated energy on the part of our members, of unflagging interest on the part of the public, I cannot mistrust our powers: on the contrary, I feel hopeful that we shall advance with the requirements of the age, and leave our mark on the world's history. The programme, at any rate, of the coming season is, in every respect, satisfactory. Great activity prevails in all quarters of the globe in pushing geographical research, and we are thus led to expect a series of papers of exceptional interest, to some of which I shall allude in the course of this opening address.

My first duty is to express the deep sense of obligation that the Council and the Society at large must feel to the Senate of the University of London for their liberality in again placing at our disposal this commodious Hall, for the purpose of our Evening Meetings during the ensuing Session. It is not too much to say that the Society owes its popularity and its means of usefulness, in a great degree, to the special facilities that we enjoy for bringing matters of general geographical interest before the public, and promoting discussion upon them, in this spacious and noble building, and we are bound, therefore, to offer our most cordial thanks to the University of London for the valuable aid they have thus afforded us.

The record of recent geographical progress having been brought down in my predecessor's Anniversary Address to the end of June, instead of the end of May—which is the usual date of our Annual Meeting—my present period of report is curtailed in a like proportion; and as this diminished interval of four months has been further broken by the Meeting of the British Association in August, when a most important address on current matters of interest was delivered before the Geographical Section by our valued Councillor, Major Wilson, there is really very little of novelty to communicate on the present occasion. It will be seen, however, that, though brief, the announcements which I have to make are entitled to the serious attention of geographers.

I will state, then, in the first place, that Major Wilson's preliminary remarks—showing from a large and varied field of induction, how essential is the study of physical geography, not only to the general requirements of military education, but especially to the successful conduct of all operations in the field, and suggesting various practical methods for improving and extending the study—have been considered by the Council to be of such great importance that they have directed them to be republished in our 'Proceedings' for the information of all the Fellows of the Society.

Several very important papers were also read before Section E at the Meeting of the Association, some of which may, possibly, be transferred to the pages of our own 'Journal.' I would particularly draw attention, in the first place, to a paper by the distinguished African traveller, Dr. Schweinfurth, on the Oases of Libya, founded on his own observations during a journey undertaken to that region subsequent to his return from Central Africa. The paper dealt especially *with the oasis El Khargeh*, describing its physical configuration, climate, productions, and people. Another paper on an African subject was one by Mr. Ravenstein, giving an account from various German sources of Dr. Nachtigall's journeys in the interior of Northern Africa. Since the departure of this adventurous traveller from Tripoli, in February, 1869, on his mission to the Sultan of Bornou on the western shores of Lake Chad, scarcely any tidings of his progress had reached England, so that it comes as a pleasant surprise to learn of his arrival in Kordofan, in Egyptian territory, having accomplished the hazardous feat of traversing the fanatical states of Waday and Darfur, on his way from Lake Chad to the banks of the Nile. During his long sojourn in the neighbourhood of Bornou he made the remarkable discovery of the bed of a river extending, it is said, 300 miles from the north-eastern corner of Lake Chad, and serving in certain seasons to drain off the surplus waters of the lake. Other papers deserving special notice were—Lieutenant Chermside's account of the scientific results of Mr. Leigh Smith's last Voyage to Spitzbergen; Lieutenant Gill's description of the route through Northern Persia, followed by himself and Colonel Valentine Baker in the summer of 1873; and Dr. Porter's Notes on his recent Journey East of the Jordan.

Arctic Discovery.—Arctic exploration is, undoubtedly, the most prominent geographical question of the day. The subject was fairly ventilated at the Meeting of the British Association, where, besides listening to the interesting and instructive remarks of the President, the Geographical Section had the advantage of hearing an excellent paper by Admiral Sherard Osborn, on 'Routes to the North Pole,' and that of Lieutenant Chermside, which I have just mentioned. Since then, however, all Europe has been aroused by the intelligence of the return of the Austrian Arctic Expedition, after being lost to sight for more than two years in the ice-bound regions of the Pole. This expedition, under Lieutenant Weyprecht of the Navy, and Lieutenant Payer of the Engineers, both experienced Arctic explorers, was prepared and supported partly by public subscription, and partly at the expense of Count Wilczek, who also accompanied it in the chartered yacht *Isbjörnen*, as far as Barents Island, off Nova Zembla. The party were embarked on board the schooner *Admiral Tegethoff*, and left Barents Island for the North in August, 1872. Very shortly afterwards the vessel was caught in the ice, and drifted with it according to the currents, sometimes to the north-east, and sometimes to the north-west, till, after fourteen months of continued danger and anxiety, the floe in which the *Tegethoff* was fixed, joined the land-ice in lat. 78° 51′ N., and long. 59° E. The winter was passed off this land, which was called, after the Emperor, "Franz Joseph Land," and in the following spring,—that is in March and April of the present year,—Lieutenant Payer explored the coast in sledges as high as 82·5° (within 40′ of Parry's furthest), and from this point observed land up to 83°, which was named "Cape Wien," and which, if we except certain doubtful reports of American discovery, is the land nearest to the Pole that has yet been sighted on the face of the earth. The gallant officer to whom is due the merit of this great discovery is here to-day to recount his adventures, and to receive your marks of approval, having come from Vienna expressly to attend the opening meeting of our Society. He will explain how the expedition was obliged, on the 20th of May of the present year, to abandon the *Tegethoff*, and endeavour with their sledge-boats to reach Nova Zembla, which island, after incurring extreme dangers, they reached in a three-months' journey, and from whence they were conveyed in a Russian vessel to Norway. Of all the interesting questions that will arise for consideration out of this long detention in the Arctic regions, the most important will probably be an attempt to ascertain whether the drifting of the floe which carried the *Tegethoff*, with some fluctuation of longitude, over five degrees of latitude to the north, was caused by the action of the wind, or whether these were ocean currents due either to tidal influences or to physical causes connected with the distribution of ice, open sea, and land, at the Pole. One result of this Austrian Expedition is at any rate quite clear. It proves the absolute impossibility of reaching the Pole viâ Spitzbergen, by sea, and thus furnishes an additional argument in favour of the route by Smith Sound, which the Royal Geographical Society have always advocated as the one most likely to afford access free of ice to a very high northern latitude. It is quite possible, however, that sledge-journeys may be made along Franz Joseph Land, and the adjoining coasts very much in advance of Payer's furthest; and it is understood that another Austrian Expedition is now being organized, for the purpose of thus extending and completing the line of discovery along this track so auspicioulу commenced.

Whilst our attention has been thus drawn to the Austrian Expedition, the publication of an English translation, this autumn, of the Narrative of the North German Arctic Expedition, which wintered in 1869–70 on the east coast of Greenland, has given the British public an opportunity of learning how much was then accomplished by the courageous and zealous seamen and savans who shared the dangers and toils of that important undertaking. *It was as a member of this* Expedition that Lieut. Payer gained that experience of Arctic glacier and sledge-travelling which has enabled him so successfully to trace the fjords and coasts of the newly discovered land.

Another Arctic voyage this year has also been made by Mr. Wiggins in Mr. Lamont's steamer *Diana*, having for its object to establish direct commercial intercourse between the shores of Great Britain and the mouth of the Obi in the Kara Sea. No immediate result was obtained, owing to want of arrangement in warning the Russian fishermen on the Obi of this new outlet for their merchandise, but the practicability of the communication was, at any rate, established, and it is probable that before long a very lucrative trade will thus be opened by sea between Great Britain and Siberia.

I regret that I am not able at present to communicate to the Fellows anything definite on the subject of the Expedition, which it has been the earnest endeavour of this Society, in co-operation with the Royal Society and several other scientific bodies of the metropolis, to persuade her Majesty's Ministers to send out at the public expense, with a view of exploring the Polar area. The letter, addressed by my predecessor to Mr. Gladstone, in December, 1873, which exhausted the subject, and which was published in our last 'Journal' as a part of the President's Anniversary Address, has not yet been answered, owing to the delays consequent on a change of Government; but I am informed that all the papers relating to the question have been placed by Mr. Disraeli before the Board of Admiralty for examination and report; and if, therefore, as I hope and almost expect, the report be on the whole favourable, it is quite possible that in the course of next year a thoroughly organized and efficient Arctic Expedition may leave our shores, under Naval officers, for Baffin's Bay and Smith Sound, and for the first time carry a flag—and that the British flag—to the Pole. Apart from all scientific considerations—apart even from professional views which regard Arctic exploration as the best training-school for the British Navy—there is a strong feeling growing up in the country that it is our duty to send forth this Expedition. Major Wilson closed his address at Belfast by a happy allusion to the motto attached to Millais' famous picture in the last Academy Exhibition, "It is to be done, and England ought to do it." This sentiment indeed embodies, I think, the feeling of the public at the present moment; the nation is proud of its past glories, it is conscious of present power, and is impatient of rivalry and delay.

Australia.—The next subject to which I shall call your attention is Australian discovery. During the last few years a very remarkable and praiseworthy activity has been displayed by our Australian brethren in stimulating Geographical research. No less than five Expeditions have been organized with a view of exploring the Western half of the Continent from the line of the Overland Telegraph to the coast settlements of Western Australia. Previous to these undertakings the furthest point in the interior of this great unexplored tract had been reached by an Expedition starting from the west, at Swan River, and commanded by Mr. A. Forrest, who, on the 15th September, 1871, attained the longitude of 123° 37′ E. on the parallel of 31°. His brother, Mr. John Forrest, the well-known and successful West Australian explorer, had previously, in 1869, reached, in lat. 28° 41′, the meridian of 122° 37′ E.; but even these extreme points fell short of the line of telegraph by 700 miles. Each successive Expedition confirmed the accounts of the aridity and impracticable nature of the interior, but it was hoped that further explorations would reveal the existence of tracts of better-watered country. In this hope Giles's Expedition, organized at Melbourne under the auspices of Baron von Müller, was started in August, 1872. It succeeded in making known a large extent of new land, but was unable to penetrate further west than 129° 40′, where its progress was stopped by a large salt lake, the limits of which could not be ascertained. In April, 1873, two other Expeditions set out, from the same point on the telegraph line and nearly at the same time; one equipped by the South Australian Government and placed under the command of Mr. W. C. Gosse, the other furnished at the cost of two private citizens, the Hon. T. Elder and Mr. Hughes, and commanded by Colonel Egerton Warburton. Gosse's Expedition advanced in a south-westerly direction towards the salt-lake discovered by Giles, and was compelled to return after eight months' absence, having reached 126° 59′ E. longitude; but Warburton, striking a route a little north of west, persevered amid obstacles and difficulties which had well-nigh proved fatal to the party, and succeeded eventually in reaching the shores of the Indian Ocean at Nickol Bay. Since then, during the present year, three other well-equipped parties have attempted to repeat this difficult feat of exploration, keeping much further to the south than Colonel Warburton; one of these, under the command of Mr. Giles, succeeded in penetrating to 125° E. long. in the latitude of Shark's Bay; the second, under Mr. Ross, travelling between the 28th and 30th parallels of latitude, was forced back by the impenetrable nature of the country, after marching only a short distance towards the west; but the third, starting from the coast at Swan River, *under the direction of* Mr. John Forrest, has, according to a recent brief telegraphic despatch, successfully traversed the whole distance.

Although none of these important explorations have brought to light any considerable extent of new country fit for settlement, they have undoubtedly prepared the way for a line of communication across the western interior of the Australian continent; and from the enthusiasm with which Colonel Warburton was greeted by all classes on his return to Adelaide, there can be no doubt that practical men in our Australian colonies foresee great material advantages as likely to accrue from these pioneer enterprises. To us, as geographers, it is gratifying to learn that some hundreds of square miles of varied country are added to our knowledge, and we look forward to the publication of the details with great interest. You will all, I am sure, rejoice to hear that Colonel Warburton, to whom we awarded our Victoria Medal of the present year, is now in England, and that he has consented to give us at our next evening meeting an account of his adventurous journey.

New Guinea.—Since his important survey of the south-eastern extremity of New Guinea, an account of which was read early last session, Captain Moresby has visited and carefully examined the north-eastern coast of this great island, and we may shortly expect further communications from his pen. M. Miklukho Maklay, also, the Russian traveller, in whose former visit to Astrolabe Bay, on the north-east coast, our Society took great interest, has recently returned from a second visit to the island, and communicated to the Imperial Geographical Society of St. Petersburg, a paper full of new and curious observations regarding the ethnology of the Papuan people. New Guinea is, indeed, likely to be henceforward one of our chief sources of geographical interest. Besides the new missions now being established on its south-eastern coasts, its western end is about to be again visited by the Italian traveller and naturalist, Dr. Beccari; and his former companion, M. D'Albertis, who has recently visited England, is also preparing to return with the intention of penetrating the mountainous interior from some of the rivers which discharge themselves on the southern coast. This last-mentioned traveller, who has gained much experience of the Papuans in his former visit to some of the most hostile tribes in the north-west is, as I am glad to announce, in correspondence with our Society, and has promised to contribute accounts of his further explorations.

Africa.—Africa has been so long and so intimately associated with names revered by geographers, and has indeed of late years so entirely engrossed the interest and the sympathies of this

Society, that it seems almost unnatural to relegate it to a secondary place in the programme of the coming Session; yet it must be apparent to all that neither at the present time, nor in immediate prospect, are African travel and discovery entitled to a more prominent position. The forthcoming publication of the Journals of Dr. Livingstone will sustain the interest of the general public in the subject; and I am happy to be able to exhibit to the Fellows this evening a copy of the map which is to accompany the work, and which will be seen to contain a large amount of new geographical detail of the distant interior, laid down from the observations of the great traveller,

In Central Africa, indeed, since Livingstone's death, there has been a lull, which contrasts strangely with the former activity. Cameron, who proceeded to Ujiji at the close of last year, in the hope of recovering some maps and papers of Dr. Livingstone, which, however, are not yet known to have reached the coast, is understood to have been since navigating Lake Tanganyika; and it is to be hoped he will thus have had an opportunity, not only of re-examining the northern end of the lake, with a view to the settlement of the hydrographical question which is in dispute between Livingstone and Stanley on the one side, and Baker and Findlay on the other, as to the connexion of Tanganyika with the Albert Nyanza, but also of determining positively whether there is any exit for the waters of the former lake through the Kabogo Mountains into the Lualaba, or on the eastern side through the Rufigi River to the sea. No direct intelligence, however, has been received from Cameron since the month of July; and it is quite possible, therefore, that ere this he may have obeyed the recall of the Society, which was forwarded to him from Zanzibar in April last, when the Society, having already disbursed from its own resources, on the Relief and Search Expedition, 2300*l.*, in addition to the funds subscribed for the purpose by the public, decided that it could no longer sustain the expense of an independent exploration. At any rate, whatever may be the present aspect of the so-called Relief Expedition, it is gratifying to me to be able to record that a liberal public, in token of their unabated interest in Central African discovery, have recently, in answer to an appeal from Cameron's friends, subscribed another thousand pounds, in order to help him through his difficulties, and enable him to do justice to the work he is engaged on. The indefatigable Mr. Stanley, also, is leading an independent expedition into Central Africa at the expense of the Proprietors of the 'Daily Telegraph' *and the 'New York Herald,'* who are already favourably known in their respective capacities as munificent patrons of research, the English journalist having recently sent Mr. G. Smith to excavate the ruins of Nineveh, while the American house supplied the necessary funds in 1871 for the discovery and relief of Livingstone. Mr. Stanley, accompanied by four Europeans, and well furnished with arms and other appurtenances of travel, had reached Zanzibar by the last accounts, and was preparing to start for the interior. It is believed that his main object is to supplement the labours of Livingstone, and it is thus supposed that he will direct his steps in the first instance to the so-called fountains of Herodotus, which lured our own hero-traveller to his death; returning thence to the Katanga mines and the subterranean dwellings at Rua, and afterwards passing on to the Lualaba, and possibly to the nameless Equatorial Lake. The Geographical Society has unfortunately no relations with Mr. Stanley at the present time; but admiring, as we do, his energy and address, and deeply interested as we are in the solution of the problems he has taken in hand, we naturally follow his footsteps with sympathetic and eager expectancy.

Lieut. Grandy has returned from the West Coast of Africa in obedience to the summons which we sent him as soon as authentic intelligence had been received of the death of Livingstone. It will be remembered that the Expedition under his command was prepared at the sole expense of Mr. James Young, of Kelly, for the express purpose of communicating with Livingstone in the interior of Africa, and furnishing him with the means, if he so desired, of passing down the Congo to the sea. When the great traveller, therefore, breathed his last at Ilala, the object of the expedition was at an end, and we did not consider ourselves justified in subjecting Mr. Young to any further expense for the mere purpose of geographical discovery. Lieut. Grandy did not, it is true, succeed in advancing along the Congo as high up as the point which Capt. Tuckey reached in 1816, but in his repeated and persistent efforts to push his way into the interior, he examined a large tract of new country both to the north and to the south of the river, his observations upon which he will, it is to be hoped, communicate to the Fellows on an early occasion. The chief result of his adventurous journey has been to show the extreme difficulty at present, owing to the intense jealousy and untrustworthiness of the native tribes, of penetrating into the interior of Africa from the West Coast at any point within 10° south of the equator; and the consequent improbability of the North German African Expedition being able to carry out their project of reaching the mysterious capital of *Muata Yanvo from this quarter.*

In Northern Africa our prospects, no doubt, are better, though as yet there has been no tangible addition to our geographical knowledge. Colonel Gordon, the new Governor of the Upper Nile Valley, must have been long since joined by the two young engineer officers, Lieutenants Watson and Chippendale, who were sent out in the summer by the Government, on the requisition of the Khedivé, to assist in the survey of the lake regions north of Gondokoro; and, as his Highness the Khedivé has since signified, through General Stanton, his approval of my suggestion that the results of the explorations of Colonel Gordon and his party should be communicated to the world through this Society, I am in hopes of receiving at no very distant date valuable intelligence with regard to the extent and configuration of the Albert Nyanza and the geography of the adjoining country.

The publication of Sir Samuel Baker's new work will also be hailed by geographers as a literary event of great interest and only second in importance to the appearance of Livingstone's own journal, which is now daily expected. Further accessions to our knowledge of the countries contiguous to the Nile Valley on the west may also be expected on the return of Dr. Nachtigall, as well as from the Egyptian conquest of Darfour. The Sultan of this petty State, which has been hitherto during the present century completely inaccessible to Europeans, having provoked a contest with the forces of the Khedivé, is likely to lose his crown, and to become tributary to Egypt; in which case not only will a further blow be dealt at the slave-trade, which is at present largely fed from this quarter, but an opportunity will also be given to explorers to connect the discoveries of Schweinfurth and Nachtigall beyond the Bahr-el-Ghazal with those of Rohlfs and other travellers in the Libyan Desert.

I must also congratulate the Society on our having received from Lieut. St. Vincent Erskine an account of his very important journey from the sea-coast at Inhambane, in South-East Africa, to the court of Umseila, between the Limpopo and Zambesi. We shall reserve an early day for the reading of this Paper, as the pending negotiations with Portugal for the sovereignty of Delagoa Bay, and the importance of securing for our colonists a near and commodious route from the sea-coast to the African gold-fields greatly enhance the present value of Lieut. Erskine's observations, and render it most desirable that his views, the result of an extensive personal experience, should be generally known. Captain Elton also, under Dr. Kirk's directions, has surveyed, in much detail, the East African coast from Dar Salam to Kilwa, and has furnished an excellent Report upon the subject, which will duly appear in our 'Journal'; whilst the many visits which are being now paid to the inland chiefs of Northern Africa, in connexion with our Ashantee Treaty and Gold Coast Protectorate, may be expected to add very largely to our geographical knowledge of that region, not only along the sea-board and adjoining forest-belt, but through the high and healthy plateau of the interior.

Madagascar.—A paper by the Rev. Dr. Mullens, on the interior of this interesting island, will be the subject of one of our evening meetings after the Christmas vacation. Judging from the maps which the author has submitted to us, drawn by him from observations made during extensive journeys in the central provinces, a new light will be thrown by his researches on the physical geography and ethnology of the country.

Asia.—My Report on the progress of geography in Asia need not extend to any great length, but if I may judge from the keen interest which attaches to the consideration of all questions affecting the relative position of the British and Russian Governments in the East, it will not be the least popular portion of my address. Since the close of our last session Sir Douglas Forsyth's Mission has returned to India from Kashgar, and the accomplished envoy is now employed in preparing for publication an account of the various Expeditions on which his officers have been employed—an account which promises to rival in interest those famous narratives of Burnes' Missions to Cabul and Bokhara, that first opened up to us a knowledge of Central Asia—now nearly forty years ago. Colonel Gordon's Expedition, to and fro, across the Pamir was undoubtedly the most important geographical feat performed by the officers of the Mission, and the account of this journey will, I trust, be brought before the Society by some member of the exploring party, either Captain Trotter or Captain Biddulph, both of whom are shortly expected in London. As I anticipated, the height of Wood's lake has been found to be much less than the measurement which had been previously accepted by geographers, and other corrections have been made of some moment. The chief geographical novelty, however, will be the description of the Shignan valley and the neighbouring regions, by an experienced native explorer, who was despatched from the Great Pamír on a journey of discovery to the westward, while political students will be interested to hear that the passes from Wakhán, communicating with Chitrál, Yassín, and Gilgít, have been well examined; the reported accessibility of the Biroghil Pass, which leads into Chitrál by an open and easy ascent, not 1000 feet above the level of the Oxus, having been confirmed; and the

Ishkaman or Karambar Pass, a short distance to the eastward, which is almost equally easy of approach, having been found to offer a convenient passage from the territory of the Mír of Wakhán to the frontier post of the Maharaja of Cashmere at the head of the Gilgít valley.

Of a kindred interest to the explorations of Col. Gordon's party on the Pamír, are the proceedings of the Russian Survey Expedition on the Oxus. The main object of this Expedition appears to have been to examine the Delta of the river, and to ascertain if any of the arms which disembogue in the Aral are permanently navigable. As yet one channel only has been found sufficiently deep to admit a steamer drawing from three to four feet water, and that is the most easterly arm of the Delta, which is named Yañi-Su, from the Aral to the Dau-kara Lake and Kuvan-jarma, from the lake to the point where it leaves the main stream in the vicinity of Nukus; and it is doubtful even if this arm would, in the low season of the river, offer a navigable channel throughout its course. Above Nukus, however, there is continuous deep water, uninterrupted by rapids, as high up as the junction of the Kokcha or river of Badakhshan.

It is thought that in examining the Oxus, the operation of a physical force has been observed which is now called "Baër's Law," and which is said to compel a river running from the south to the north, in the northern hemisphere, to cling to its right bank, partly from the mere rotatory motion of the earth from west to east, and partly because the water should contain within itself an inherent projectile force in the same direction, the rotatory velocity of 1000 miles an hour, to which, for instance, a river would be subjected at the equator, being reduced in its northward course in the ratio in which the circumference of the sphere is diminished, and this difference of velocity becoming, in so far as it is not exhausted, a motional property of the water. On the Oxus, certainly, such a law would seem to prevail; all the natural deviations from the original stream being to the east, and all the cities upon the right side of the river having been thus destroyed one after the other by the erosion of the banks. At the present day, indeed, continuous deep water is only found along the eastern shore of the river, and the most easternly channel of the Delta is in the same way the only one that is now navigable. If, however, such a law did really exist in nature, it must apply especially to the Nile, where the direction of the stream is almost due south and north, and where moreover the alluvial bank swould yield readily to friction. Yet on this river no such tendency to run off to the east has ever been detected; and the

Bäer Law therefore is not at present universally accepted by Physicists.

In connexion with the Oxus survey, some other important engineering operations are being carried on by the Russians; some of practical utility, others of antiquarian interest. On one side a line of levels is being carefully run across from the now desiccated Aibugir lake to the Caspian, along the old river-bed called the Usböi. The Oxus waters often penetrate in this bed as far as the Sary-kamish lake, and it is now said, that, in the interval between that point and the old embouchure near the entrance of the Balkan Bay, no such upheaval of the earth's surface, as has sometimes been asserted, can in reality be traced, but that, on the contrary, the dry channel can be excavated without much difficulty, so as to form a navigable ship-canal the whole way between the Oxus and the Caspian. A second line of levels is also being run across from the Caspian to the Aral between the 45th and 46th parallels of latitude, with a view to the junction of the two seas by a railway at this their nearest point of contact. The other operation to which I have alluded as one of antiquarian interest, is a survey of the Yañi-darya, a former bed of the Jaxartes, from the Dau-kara lake to the point of bifurcation at Fort Perofsk; a survey which is of the more importance as it must have been along this line that the Jaxartes discharged its waters into the Oxus, and through the Oxus into the Caspian, at the time, only 400 years ago, when, according to the direct testimony of the native historians and geographers who lived on the spot, the Aral had been entirely dried up and was only known as a thing of the past. An officer of the Royal (Madras) Engineers, Major Wood, having been invited by the Russian Government to join the expedition, has been present as an amateur on board the steamer *Perofsky* in all the preliminary examination of the Oxus Delta, and has now accompanied Colonel Stoletoff from Nukus to Fort Perofsk, along the line of the Yañi-darya, so that we may soon expect reliable intelligence from him of the utmost interest as to the general question of the hydrography of the Oxus and Jaxartes.

Another expedition, from which much is expected, is also about to leave Calcutta for Burmah and Yunnan. Furnished with passports from the Central Government at Pekin, and accompanied by an interpreter who has been sent from head-quarters to Rangoon to meet them, they will proceed from Mandalay across the frontier by Momein to Talifoo, and will thus have abundant opportunities of acquiring most valuable geographical information. Colonel Brown is in command, having under him that experienced traveller, our medallist, Mr. Ney Elias, and also that accomplished naturalist

Dr. Anderson, so that the interests of science have evidently been sufficiently cared for.

Whilst I am considering this portion of Asiatic geography, I may also express our deep regret at the death from fever of the two French officers, Messrs. Fan and Moreau, who were recently despatched from Mandalay to open up a communication with the French possessions in Tonquin. We are ourselves, in the mean time, continuing a rough survey of the country from Toung-ho north-east of Prome to Kiang-hang on the Mekong or Cambodia River, which is the frontier town between the Burmese and Annam dependencies; so that there is every prospect of a line of route being opened up before long across the Peninsula from Rangoon to the Tonquin River.

From Persia the only intelligence of geographical interest is the deputation of Captain Napier to Khorassan for the purpose of examining the frontier between Herat, Meshed, and Merv, where Turcoman raids are of frequent occurrence, and where it is thus of much importance to define the true territorial distribution. Captain Napier, it is hoped, by his observations in this region, will be able to fill up a space in Major St. John's Map of Persia, which has hitherto been left blank, to the despair of geographers and the great inconvenience of all who are interested in the preservation of peace upon that frontier.

I may further notice that we have reports of much interest from the Samoan Islands, from Formosa, and other little-known localities, which in due course will be brought before the Society; and now, in concluding my address, I beg to congratulate the Society on the very favourable auspices under which our session is opened, the most successful explorer of the day being present to introduce his discoveries in person to the notice of the Fellows, while the most experienced traveller also among the Princes of our Royal House, and the heir to the throne of all the Russias, have further been good enough to show, by their attendance on this occasion, the deep interest which they take in the prosecution of geographical science.

The President then proceeded to say:—Your Royal Highnesses, Ladies and Gentlemen,—Having concluded my opening address, I now have the honour to introduce to the Fellows of the Royal Geographical Society Lieutenant Payer, of the recent Austrian Arctic Expedition. Without detaining you any length of time from the pleasure of hearing his very interesting paper, I must still say a few words in explanation of the circumstances under which he now appears before you. The Royal Geographical Society, as all the Fellows know, esteems it one of their chief privileges to be able to recognise merit wherever it is found, without any distinction of creed or nationality, and without regard to the quarter of the globe in which discoveries are made, *save and except always that* we are most interested in those regions with which we are most familiar. You will all recollect that for a long series of years the Polar regions used to be considered almost as the private domain of British navigators. I believe that for some twenty or thirty years it was the British flag alone which was seen in those seas, and I think Arctic navigators will bear me out when I say that there is hardly a strait or a sound between Behring Straits, on the one side, and Baffin's Bay on the other, that has not been navigated by British ships. Great names will occur to all present—names revered by all geographers, such as those of Parry, the Rosses, Back, Franklin, M'Clintock, and others. Some of these Arctic explorers I have the pleasure of seeing present on this occasion, with their laurels still blooming on their brows. Some, I regret to say, are accidentally absent. Sir George Back and Admiral Osborn are unfortunately not here, but I see others who recall the days of our old Arctic glories. After a time our efforts relaxed. It must be remembered that our original object was the discovery of a North-West Passage. That was succeeded by the efforts made for the relief of Franklin; and then, as we relaxed, other nations took up the broad question of Arctic discovery,—the Americans, the Swedes, the Russians, and last, though not least, the Germans. On our part there was no jealousy at this competition. We have always been ready to recognise and welcome discovery from whatever quarter it has proceeded; and on the present occasion, I believe that the Geographical Society is just as proud of the exploits of Lieutenant Payer, and just as much desirous to give him an honourable and cordial welcome, as if he were a member of our own body. At any rate, immediately that the intelligence reached us of the return of the Austrian Arctic Expedition to Europe, on the part of our Council I addressed a letter of congratulation to the Imperial Geographical Society of Vienna; and in continuation of that letter, I sent an invitation from our Society to Lieutenant Payer to attend at our opening meeting. At considerable personal sacrifice he has now come over from Vienna in order to announce his discoveries in person. I am very happy to find that on this occasion so many persons thoroughly well informed on the subject are able to attend. I will not attempt to point out Lieutenant Payer's track upon the map, because you will learn full details from his narrative; but, after you have heard his adventures, I shall call upon you to accord him your most cordial thanks for the trouble he has taken in coming over to this country, and also congratulate him on the gallant and persevering and successful way in which he has carried out his researches.

Lieutenant PAYER then addressed the meeting in German.

The Austro-Hungarian Polar Expedition. BY JULIUS PAYER.

IT was not the object of the Austrian Expedition to search for the unknown country which the results of our preliminary expedition, undertaken in 1871, had made it likely would be found to the north of Novaya Zemlya, but to discover a North-East Passage. This, its principal object, the Expedition has failed to attain, and the country referred to was discovered instead.

The limited time, as well as the dignity, of a scientific meeting, require that in the following Report all those events of a mere personal nature, and the adventures incidental to every Arctic expedition, should not be dwelt upon; and this all the more as the limited time will not even permit us to treat facts of scientific interest at as great a length as we should desire.

The *Tegethoff*, a screw-steamer of 220 tons, left Bremerhafen on the 13th of June, 1872, furnished with stores and provisions calculated to last about three years. Including Captain Carlsen, the well-known Norwegian navigator, who joined the Expedition at Tromsö, in the capacity of ice-mate and harpoonor, the crew numbered twenty-four men all told, amongst whom were sixteen Dalmatian seamen.

On the morning of the 14th of July we left Tromsö, shaping our course towards the north-east. A few days afterwards we doubled the North Cape, and on the 25th of July, when in 74° 30′ N. lat., and 48° E. long., we reached the edge of the packed ice, the unexpectedly southern position of which we had every right to consider a bad omen.

The masses of ice against which we had to struggle at that time, as well as those which we encountered subsequently, were certainly far less formidable than those with which we had become acquainted five years before on the coast of Greenland, but they, nevertheless, seriously obstructed our progress. Large floes, separated by navigable lanes of water, were rarely met with, but immense quantities of broken fragments. Early in August we were actually beset for a few days, so as not to be able to move. Subsequently, however, we regained our liberty, and in lat. 75° N. we reached the open water extending along the coast of Novaya Zemlya. The decreasing temperature, and quantity of ice, showed indeed that the summer of 1872 was the very opposite of that of the year before. Aided by steam-power we fought our way through a second barrier of ice, and only reached open water in the latitude of William Island. When still a little south of that island, we were overtaken by the yacht *Isbjörn*, in which Count Wilczek had effected his difficult passage from Spitzbergen, in order to establish a depôt for our use near Cape Nassau.

The two vessels kept company as far as the low Barents Islands, where compact masses of ice, driven by south-westerly winds towards the coast, barred all progress for a week. Only on the 21st of August, the ice having exhibited symptoms of breaking up, we parted company, and the *Tegethoff* steamed slowly away towards the north.

But our hopes were vain. Night found us encompassed on all sides by ice, and for two long and dreary years! Cheerless, and barren of all hope, the first year lay before us; and we were not any longer discoverers, but doomed to remain as helpless voyagers on a floe of drifting ice.

The unusally severe frost of the autumn of 1872 soon solidified the surrounding fragments of ice, from which neither sawing nor blasting were able to effect our release. All our exertions were frustrated by its incredible elasticity, and by the rapidity with which pieces sawn asunder froze together again. Thus fettered we drifted, at the mercy of the winds, towards the north-east.

Our position was thus sufficiently miserable; but on the 13th of October it became gloomy in the extreme. On that day the lethargy in which everything around us had so long been buried, suddenly gave place to active commotion, and thenceforth we were exposed to the fearful pressure of the ice. Many a time we were summoned to be ready to save ourselves in case of the vessel foundering; and all this in the midst of a Polar night, and without knowing whither to turn for safety. Our vessel, however, bravely withstood the pressure, though the floe upon which it was fixed had been uplifted by others which had forced their way under it, thus raising her aft, and causing her to heel over to port.

Preparations for passing the winter had by this time been made. The deck was covered with snow, an awning was spread from the mainmast forward, and a rampart of ice fixed round the ship. The latter required to be repaired frequently, in consequence of the havoc caused by the motion of the ice.

Special care was taken to keep the crew employed. Watches were set regularly, exercise was taken, and school kept. On Sundays, the members of the Expedition met for a simple but impressive Divine Service under the awning, when the Bible was read in Italian by the light of a train-oil lamp.

Meteorological observations were made regularly; Lieutenants Brosch, Orel, Captains Carlsen, Lusina, and Krisch, relieving each other every two hours. The uncertainty of our position rendered it necessary to keep a watch constantly on deck, through which we were regularly informed of the approach of Polar bears, whose flesh formed a most important addition to our diet. Nevertheless, the sanitary condition on board, during the first winter, left much to be desired, so that our excellent surgeon, Dr. Kepes, was kept fully occupied. Scurvy and affections of the lungs made their appearance, in spite of every precaution; the former partly on account of the occasional congelation of the damp covering our cabin walls, and partly owing to mental depression brought on by our critical position, and which only disappeared when it became more hopeful and the summer's work kept everyone fully occupied.

Our small stock of wine was reserved for the use of the sick. The rest contented themselves with a daily allowance of artificial wine, which we prepared on board from glycerine, sugar, meat extract, tartaric acid, alcohol, and water. A small plant suspended over the cabin stove supplied us every week with a little cress and cabbage for the scorbutic. The dogs, whose number had by that time been reduced to seven, were lodged on deck in boxes filled with straw. They were fed, at first, with dried horse-flesh, and subsequently on the flesh of seals and bears.

On the 28th of October the sun disappeared below the horizon, not to rise again for 109 days. All the birds had left us, and during five long winter months we were obliged to burn lamps in our cabins. For weeks it was next to impossible to leave the ship. The polar night was rarely of that indescribable clearness which has been noticed on land, and by ourselves on the coast of Greenland. Whenever a sudden change of temperature caused the expanse of ice to break up, dense vapours arose from the fissures, which not only further obscured the generally inky sky, but likewise produced that immense amount of precipitation which we experienced, especially during our second winter. A fine snow fell almost continuously, and in the course of the winter of 1873–74 it attained a depth of 12 feet. On the arrival of spring our vessel was completely buried in it, although nearly the whole of the snow which fell during the preceding winter had disappeared during the summer.

Our observations on the evaporation of the ice during the Polar night agree in the main with the results obtained by Parry on Melville Island. The winds nearly balanced each other as regards direction as well as force.

A hut of coal had been built on the ice, to serve as an asylum in case of the vessel being lost, but it was destroyed by a movement of the ice on Christmas Eve; and we considered ourselves fortunate in being permitted to open Christmas Day itself in undisturbed tranquillity, occupied with thoughts of home.

The first day of the new year brought with it no prospect of an early release. We were still drifting towards the north-east, and even imagined that we might be carried to the coast of Siberia. Fate, however, had ordained otherwise; for, after we had crossed the 73rd degree of longitude, the wind shifted, and thenceforth, helpless as before, we drifted towards the north-west.

On the 16th of February the sun again made his appearance above the horizon; and on the 25th the pressure of the ice which had tormented us hitherto, having literally hemmed us in by a wall of craggy ice-mountains, ceased as suddenly as it had begun. The cold continued to be severe: the mean temperature of February was 31° Fahr., and towards the close of that month it reached its highest minimum, 51° Fahr. But this cold is borne easily, as the cabin affords ready means for warming oneself; and consequently several of our men only reluctantly put on their fur clothes when ordered on deck.

The Polar lights in their ineffable beauty illuminated the heavens during the whole of the winter, but diminished in frequency as the days grew longer. They generally appeared in the south, and only rarely was more than one corona seen on the same night. Since the beginning of September they were the only incitation which we received from beyond. Like mighty streams they rushed over the firmament, sometimes from west to east, at others in a contrary direction; and the corona vanished as rapidly as it appeared. They were most intense between eight and ten in the evening, and their appearance was never attended by noise. Magnificent lights proved generally the forerunners of bad weather.

In the summer of 1873 our hopes of an early destruction of the floe, and consequent liberation, revived. The mean temperature of the past year had been 2·75° Fahr. In the course of the summer we observed a maximum temperature of 45° Fahr.; the black-bulb thermometer occasionally indicated a solar heat of 113° Fahr., and on days like these, when there was no wind, we had a sensation of stinging heat. Our hopes were based upon the evaporation of the ice, caused by the powerful effect of the sun, and upon its destruction by winds and waves, but not upon its melting in a sea the surface temperature of which never rose above freezing-point. The progressive conversion of the surface ice into sludge was witnessed by us from day to day, the cliffs and walls of ice crumbling away and evaporating, until nearly the whole of the sea was covered with a thick chaotic layer of sludge.

Thus encouraged, we made fresh efforts to regain our liberty, and the months of May, June, July, and August, were spent in futile endeavours to saw through the ice which surrounded us; but our floe, which had attained a thickness of 40 feet, in consequence of other floes forcing themselves underneath it, rendered all our attempts futile. The centre of our vessel, and the uplifted part abaft, remained immovably fixed upon the floe. The surrounding ice and snow having melted away and evaporated to the extent of 12 to 18 feet, we found ourselves fixed at a considerable elevation above the general level; and the danger of being capsized had to be provided against by supporting our masts with strong spars. I ought to state that our floe varied considerably in size from time to time; during the last winter it was shattered almost daily, but congealed again immediately. At the time now referred to (August, 1873), it was 5 to 7 miles in diameter.

The northerly winds of July drifted us to the south, as far as lat. 79°; but August saw us again drifting to the north. I ought to state distinctly that nothing justified us in the assumption that the direction in which we drifted was at any time due to oceanic currents. The winds alone caused it, and a cessation of the wind led to a cessation in the movement of the ice. It struck us as remarkable that the direction in which we drifted was always on the right hand of that in which the wind blew, and that our vessel should have veered only to the extent of one degree in azimuth during the four preceding months.

In the course of the summer of 1873, when in about 79° N. lat. and 60° long., we drifted over an extensive bank; our soundings, which had hitherto varied between 100 and about 300 fathoms, becoming much less.

The temperature of the sea was measured at different depths, and the use of the dredging apparatus resulted in a small zoological collection, only a portion of which we were able to bring to Europe. Drawings of some of the specimens which we had to abandon have, however, been made.

Our hopes that the ice would break up grew less and less every day, though the familiar grating sound which proceeds from the ice giving way was heard frequently, and dark streaks on the horizon pointed to the existence of fissures in the ice. We had already resigned ourselves to the necessity of being obliged to pass a second winter as inactive and perilous as the first, when the state of affairs all of a sudden underwent a change in our favour.

We had long ago been drifted into a portion of the Arctic Sea, which had not previously been visited; but, in spite of a careful look-out, we had not been able hitherto to discover land. It was, therefore, an event of no small importance when, on the 31st of August, we were surprised by the sudden appearance of a mountainous country, about 14 miles to the north, which the mist had up to that time concealed from our view.

At that moment all our past anxieties were forgotten; impulsively we hastened towards the land, though fully aware that we should not be able to get further than the edge of our floe. For months we were doomed to suffer the torments of Tantalus. Close to us, and in fact almost within reach, was a new Polar land, rich with the promise of discoveries, and yet, drifting as we were at the mercy of the winds, and surrounded by open fissures, we were unable to get any nearer to it.

At length, towards the end of October, we approached within 3 miles of one of the islands forelying the main mass of the land. Every other consideration was now thrown to the winds, and making our way over the rugged, hummocky surface of the ice, we for the first time placed our feet upon land in lat. 79° 54′ N. The ice covering the sea close to the shore was only one foot in thickness, and it was clear that an open lane of water had existed periodically during the preceding summer. An island more desolate than that which we had reached can hardly be imagined, for snow and ice covered its frozen and *débris*-covered slopes. But to us it was of such importance, that the name of Count Wilczek, the originator of our expedition, was conferred upon it.

The sun had deserted us for the second time on the 22nd of October; but we availed ourselves of the few hours vouchsafed us for a week afterwards to make a few excursions to a distance of 10 miles from the vessel, without, however, being able to enlarge our knowledge of the new country. Was it merely the southern capes of islands of small extent which we had before us, or a country of large extent? Nor were we able to determine whether the white patches which we discovered high up between the mountains' summits were glaciers or not.

The increasing darkness of the Polar night for the present rendered every attempt at exploration impossible; and we feared that northerly winds might drift us far away from our present position before the approach of spring should enable us to commence our exploratory journeys. Nor was our position at that time at all a safe one. Southerly winds had driven us close to the land, and during the first half of October we still suffered seriously from the pressure of the ice. Our floe was shivered into fragments, and it almost appeared as if the anxious days through which we had passed were about to return. In expectation of an unfortunate issue, we took the same measures of precaution which we had taken during the preceding winter, and were ready to leave the ship at a moment's notice. Fortune, however, did not again forsake us, and we were permitted to pass the second Polar night (125 days in length) without suffering the horrors of the first. There occurred no further pressure from the ice; and our vessel, fixed to its floe, and surrounded for the first time by icebergs, remained immovable, close within the outer edge of the land-ice, and at a distance of three miles from the nearest coast.

This position enabled us to look towards the future with a certain amount of assurance; it rendered existence more endurable, and enabled Weyprecht, Brosch, and Orel to determine the magnetic elements with a great amount of accuracy. Orel, moreover, determined the astronomical position of our winter quarters, which he found to be in lat. 79° 51′ N., and long. 58° 56′ E.

During the winter of 1873-74 much more snow fell than during the preceding one, and snow-drifts, brought on by northerly winds, continued for days. At the height of the Polar night, we were scarcely able to distinguish night from day, and were enshrouded in darkness for weeks. Christmas was celebrated in a snow-house built upon our floe. In January the cold set in again exceedingly severe, and the mercury remained frozen for more than a week. The snow became as hard as pumice, and its surface granular. The petroleum in the glass lamps under the awning froze, the lamps went out, and even our cognac was changed into a solid mass.

The visits of bears were as frequent then as they had been at other seasons of the year: they came close up to the ship, and were killed by regular volleys fired from deck. The bears here are certainly much less ferocious than those we met with in Eastern Greenland, where they not infrequently attacked us, and, on one occasion, they even carried one of the crew out of the ship: here they generally took to flight as soon as we made our appearance. As regards the disputed question whether bears pass the winter in a dormant state or not, we observed that amongst the great number shot by us during two winters, there was not a single female; and during our second sledge expedition in the spring of 1874, we even discovered a tunnel-shaped winter hole in a snow cone lying at the foot of a cliff, which was inhabited by a female bear and her cubs. On encountering bears, we found it generally most advantageous to fire after they had approached within a distance of 50 or 80 paces.

A portion of the flesh of sixty-seven ice-bears which we killed, amounting altogether to about 12,000 lbs., proved to be the most efficient remedy against the scurvy, from which several of our men were again suffering. The care of our surgeon, as well as the re-appearance of the sun on the 24th of February, saved most of our patients from protracted suffering; but, owing to our stock of medicines having become very much reduced, a third winter would certainly have exhibited far more unfavourable results. This consideration, joined to the certainty that our vessel was indissolubly fixed to the floe, which in the ensuing summer would again drift about at the mercy of the winds, as well as the danger of its capsizing on the melting of the snow, led to the resolution to abandon the vessel towards the end of May, and attempt a return to Europe by means of our boats and sledges.

The interval was to be devoted to an exploration of the country by means of sledge expeditions, the fortunate termination of which must be left in no small measure to chance. For had the vessel been drifted away during the absence of the explorers they would have been exposed to certain destruction, and the crew remaining on board would have been weakened considerably. But the exploration of the country, lying as it did so invitingly before us, was considered to be worth the risk.

March had arrived, and, although the cold was still severe and the weather by no means favourable, the necessity of making the best of the short space of time at our disposal induced us to start upon our first sledge expedition. On the 10th of March the Tyrolese Haller and Klotz, the sailors Cattarinich, Lettis, Pospischill, and Lukinovich, three dogs, and myself, left the *Tegethoff* with our big sledge. We travelled in a north-westerly direction, along the coast of the extensive Hall Island, ascended Capes Tegethoff and M'Clintock, 2500 feet in height, and traversed the picturesque Nordenskjöld Fiord, the interior of which was bounded by the gigantic ice-wall of the Sonklar Glacier. The land before us appeared to be utterly void of life—immense glaciers looked down upon us from between the desolate mountains, which rose in steep doleritic cones and plateaus. Every object around us was clothed in a mantle of glaring white, and the ranges of columns of the symmetrical mountain-terraces looked as if they were encrusted with sugar. In no single instance could we see the natural colour of the rock, as in Greenland, Spitzbergen, or Novaya Zemlya. This was owing to the immense precipitation and the moisture of the air, which condensed in coming into contact with the even surface of the cliffs. The unusual moisture of the air, moreover, caused us frequently to over-estimate distances, which is quite contrary to the usual Arctic experience. Perfectly clear days were exceedingly rare.

The cold during this journey was very great, and amounted on one occasion to 58° Fahr. (on board ship it was 46·25 Fahr.). We were bound to exercise the greatest precaution: our nightly rest in the tent was disturbed, and the crossing of the Sonklar Glacier, during a slight wind, was exceedingly painful. Our clothes were as stiff as a coat of mail, and even our rum, strong as it was, appeared to have lost both potency and fluidity. We slept in fur coats, but in the daytime we found that clothes made of the skins of birds were best adapted for resisting the rigour of the climate. In spite of every precaution, however, we suffered much from frost-bites, against which a mixture of iodine and collodion proved most efficacious.

Immediately on our return to the vessel, on the 16th of March, we set about making preparations for a second sledge expedition, which was to extend over thirty days, and was to be devoted to an exploration of the land in the north. Soon afterwards one of our companions (Mr. Krisch, the engineer) succumbed to a protracted tuberculosis of the lungs, aggravated by scurvy. On the 19th we buried him in a lonely spot surrounded by columnar basalt, and erected a wooden cross upon his grave.

On the 24th of March we started for the north. Our party included Mr. Orel, the two Tyrolese, three sailors (Zaninovich, Sussich, and Lukinovich), and myself. We all wore snow-spectacles, blinkers, masks covering half the face, knitted woollen gloves, and sail-cloth boots. We were armed with double-barrelled Lefaucher rifles, having a calibre of 12^{mm}, and firing explosive bullets and steel projectiles. In preparing our equipment we followed explicitly the advice given by Admiral Sir Leopold M'Clintock, and the successful issue of our expedition is due largely to this circumstance.

Our team of dogs, unfortunately, was not any longer complete, and only three of them assisted us in dragging our large sledge, which carried stores and provisions weighing 16 cwts. The rest of the dogs were either dead or incapable of rendering service; but even the three remaining ones, being powerful animals, proved valuable auxiliaries.

The temperature during this journey, quite contrary to our expectations, did not fall below 26·50° Fahr., but snow-drifts and moisture, the opening of fissures in the ice, and the flooding of our path by the sea gave us much trouble.

The results of this journey cannot be fully appreciated without reference to maps and sketches, and, anticipating the chronological order of our report, we will at once state that the newly-discovered country equals Spitzbergen in extent, and consists of several larger masses of land—Wilczek Land in the east, Zichy Land in the west—which are intersected by numerous fiords and skirted by a large number of islands.

A wide sound—Austria Sound—separates these masses of land. It extends north from Cape Hansa to about lat. 82° N., where Rawlinson Sound forks off towards the north-east. The latter we were able to trace with the eye as far as Cape Buda-Pest.

The tide rises about 2 feet in Austria Sound, and exercises but a small effect, merely causing the bay-ice to break near the coasts. Dolerite is the prevailing rock. Its broad, horizontal sheets, and the steep table-mountains, which recal the Ambas of Abyssinia, impart to the country its peculiar physiognomy. Its geological features coincide with those of portions of North-eastern Greenland. A tertiary carboniferous sandstone occurs in both; but only small beds of brown coal were discovered. On the other hand amygdaloid rocks, which are so frequent in North-eastern Greenland, were not met with in Francis-Joseph Land, and whilst the rocks in the south were frequently aphanistic in their texture, and resembled true basalt, those in the north were coarse-grained and contained nepheline.

It is an established fact that portions of North-eastern Greenland, Novaya Zemlya, and Siberia, are being slowly upheaved; and it was therefore very interesting to meet with raised beaches along the shores of Austria Sound, which attested that a similar upheaval was taking place here likewise.

The mountains, as a rule, attain a height of 2000 or 3000 feet, and only towards the south-west do they appear to attain an altitude of 5000 feet. The extensive depressions between the mountain ranges are covered with glaciers of those gigantic proportions only met with in the Arctic Regions. Only in a few instances were we able to determine the daily motion of the glaciers by direct measurements. On the coast they usually form mural precipices, 100 to 200 feet in height. The Dove Glacier on Wilczek Land is undoubtedly one of the most considerable of the Arctic Regions. The glaciers visited by us were characterised by their greenish-blue colour, the paucity of crevasses, and extraordinarily coarse-grained ice, a small development of moraines, slow motion, and the considerable thickness of the annual layers. The *névé*, or glacial region above the snow-line, was much more elevated above the sea than in Greenland or Spitzbergen.

Another peculiarity which characterises all the low islands in the Austria Sound is their being covered by a glacial cap.

The vegetation is far poorer than that of Greenland, Spitzbergen, or Novaya Zemlya; and, excepting in the Antarctic Regions no country exists on the face of the earth which is poorer in that respect. The general physiognomy of the flora (but not that of the species) resemble that met with in the Alps at an altitude of 9000 or 10,000 feet. The season during which we visited the country was certainly that in which vegetable life first puts forth its appearance, and most of the slopes were still covered with snow; but even the most favoured spots near the sea-level, which were no longer covered with snow, were unable to induce us to arrive at a different conclusion. On level spots even we scarcely met with anything but poor and solitary bunches of grass, a few species of Saxifrage, and *Silene acaulis*. Dense carpets of mosses and lichens were more abundant, but most abundant of all was a lichen—the winterly *Umbilicaria arctica*.

Drift-wood, mostly of an old date, was met with on many occasions, but only in very small quantities. We once saw, lying only a trifle higher than the water-line, the trunk of a larch, about a foot thick and some 10 feet in length. The drift-wood, like our vessel, has probably been carried to these latitudes by the winds, in all likelihood from Siberia, and not by currents.

The country, as might have been supposed, has no human inhabitants, and in its southern portion scarcely any animals excepting ice-bears are met with.

Many portions of the newly-discovered country are exceedingly beautiful, though it bears throughout the impress of Arctic rigidity.

This and the subsequent sledge journeys have convinced us of the difficulty which any future expedition would meet with in discovering a harbour to winter in; no locality for such a purpose having been discovered by us.

It has always been a maxim of Arctic explorers to name their discoveries in honour of the promoters of their enterprise, or of their predecessors. The countries discovered may never become of commercial importance, but the only manner in which I was able to record my gratitude towards those who had devoted their means to the success of our expedition, consisted in connecting their names with the newly-discovered countries. The name of H.S.M. Francis Joseph was consequently bestowed on the whole of the country discovered by us, and other names to the several parts of it.

Owing to the mists which generally hung over the ice, we should not have been able to trace the northerly direction of the Austria Sound had we not frequently ascended high mountains. The ascents of Capes Koldewey (80° 15′), Frankfurt (80° 25′), Ritter (80° 45′), Kane (81° 10′), and Fligely (82° 5′), moreover enabled us to survey the surrounding country, and to select the more suitable tracts to follow.

An uninterrupted expanse of ice, with numerous icebergs scattered over its surface, extended from coast to coast. It was evidently of recent formation, and numerous fissures and barriers formed of hummocks crossed it in many places, and constituted serious obstacles to our progress, which we were able to surmount only at a vast expenditure of time and labour. Our track then led over this expanse of ice, and, starting from Cape Frankfurt at the portal of Austria Sound, it led us through regions, with respect to which we had learnt nothing during our first sledge journey.

Omitting for the present all details concerning our journey, it may suffice to state that we crossed the 80th degree of latitude on the 26th of March, reached the 81st degree of latitude on the 3rd of April, and observed, five days afterwards, the latitude of 81° 37′. We imagined at that time that we had approached nearer to the Pole on land than had ever been done before, for we were not then aware that the American Expedition under Hall had reached 82° 9′ on land, and 82° 26′ by sea, the year before.

To the south-east of Crown-Prince Rudolf Land, we turned into the vast Rawlinson Sound, which promised to lead us almost straight to the north; but we soon got entangled in a chaotic mass of ice, which, owing to its height, prevented us from seeing the land, through which it required our utmost exertions to force our way, The small horizontal intensity of the needle, moreover, which is but natural in a high latitude, repeatedly made us lose our way; and finding that the hillocks of ice became more formidable in proportion as we advanced, we changed our course, and returned to the Austria Sound. We frequently encountered ice-bears while in the Rawlinson Sound. They came towards us whenever they caught sight of us, and fell an easy prey to our rifles.

The decrease of our provisions, and want of time, made forced marches necessary, and necessitated a separation of our party. The large sledge, with Haller and four others, was left behind in lat. 81° 38′, under a cliff of Hohenlohe Island; whilst Orel, Zaninovich, and myself, with the dog-sledge and half the tent, continued the journey. The sledge was now drawn by two dogs only, and the third, a Lapland reindeer dog, having some time previously perished in a snowstorm, Haller was ordered to wait a fortnight for our return, and then to make the best of his way back to the vessel.

Our first aim was to cross Crown-Prince Rudolf Land in a northerly direction. This necessitated our crossing the extensive Middendorf Glacier, which past experience and the great cold justified us in believing to be possible, and we at once set about it. After a laborious journey along the terminal cliff of the glacier, we at length succeeded in gaining its surface, but had scarcely proceeded a hundred paces when an immense crevasse swallowed up Zaninovich, the dogs, and the heavily-laden sledge. Mr. Orel, most powerfully by the fact that a very high latitude has been reached here on repeated occasions. If an expedition should succeed in reaching a winter harbour in a latitude as high as that reached by the last American Expedition, it would then be in a position, by means of extensive sledge journeys along the coast, to reach a latitude in the course of spring, the attainment of which would be attended by far greater difficulties along any other routes.

Our own track to the north of Novaya Zemlya carries no weight in considering this question, for we were indebted for our progress to a floe of ice, and not to our own exertions. The difficulties which any succeeding navigator would have to contend with on this route may be estimated from the fact, that on our return we found the sea encumbered with ice to such an extent that even boat-navigation was hardly possible, and we were obliged to haul up our boats many hundred times and drag them over the ice. We certainly should not have been able to return in our vessel, although the summer of 1874 was exceptionally favourable. But if an expedition be fitted out, not with a view of reaching the highest possible latitude, but to study the nature of Arctic countries, then the interior of Greenland would certainly appear to be deserving of the first consideration. But our neighbourhood was at that time of more immediate interest to us than the question of the navigableness of a remote portion of the Arctic Ocean. We had before us extensive lands covered with mountains, and bounding a wide sound stretching towards the north-east, which we were able to trace as far as lat. 83° N., where the imposing Cape Wien (Vienna) forms the western extremity of a country upon which I conferred the name of Petermann, to whom geographical science, and particularly Arctic explorers, are so largely indebted. The land opposite this I named King Oscar Land.

Crown-Prince Rudolf Land extended towards the north-east, its furthest visible point being a cloud-wrapt rocky promontory in lat. 82° 20′ N., named in honour of Admiral Sherard Osborn. Two other localities, visited by us, but not on this occasion, were named after two other renowned English navigators, namely, Admirals Collinson and Back.

We do not desire to start any fresh theory with reference to the distribution of land around the Pole; but the coasts as well as the gigantic glaciers certainly gave us the impression of having entered a group of islands of considerable extent, thus partly confirming Petermann's theory of an Arctic archipelago.

The innumerable icebergs met with in all the fiords of Francis-Joseph Land formed a remarkable feature, for to the south of it—

that is, in the Novaya Zemlya Sea—scarcely any were met with. We are not in a position to ascribe the presence of these icebergs to ocean currents, though their absence in the Novaya Zemlya Sea would appear to point to their finding an outlet towards the north.

Having planted the Austro-Hungarian banner upon the farthest point reached by us, and deposited a document, testifying our presence, in a cleft of the rocks, we turned back towards our vessel, which lay some 160 miles to the south.

Having rejoined our comrades, who anxiously waited for our return at Hohenlohe Island, forced marches, and a deliverance from all impedimenta excepting the tent and provisions, soon brought us to lower latitudes. But after we had crossed the glaciers of the imposing Ladenburg Island, and reached Cape Ritter (19th April), we were disquieted by the observation that the sea-water had permeated the lower layer of snow, whilst a dark water-sky hung over the broad entrance to Markham Sound. On retiring to rest, we distinctly heard the grinding noise of ice, and the surge beating against the shore.

The next day found us on an iceberg not far from the Hayes Islands, with open water in front of us, and no boat to cross it. The water set rapidly towards the north, owing, probably, to the tide. The southern portion of Austria Sound had been converted into a "Polynia," and, at a distance of 30 paces from where we stood, the surf lashed the ice. After wandering about for two days, during a fearful snow storm, we managed, by following the land and the mural termination of glaciers, to go about this open water which shut off our return; and it was with a feeling of deliverance that we again stepped upon the solid ice near Cape Frankfurt. Our last apprehensions were removed when we found that our vessel had not drifted away, and on the 24th of April we again boarded the *Tegethoff* on the very spot south of Wilczek Island where we had left her thirty days before.

A few days had necessarily to be devoted to repose, for although we had eaten the flesh of eight bears, which we had killed during our journey, this addition to our diet was not sufficient to counterbalance the reduction in our strength brought about by the extraordinary exertions which we were called upon to undergo when dragging a sledge for eight to ten hours at a stretch, and a night's rest of only five hours' duration.

Our third sledge journey was devoted to an exploration of the extensive M'Clintock Island. Brosch, Haller, and myself, with the dog-sledge, joined in it. When about forty miles to the west of our ship, we ascended a high mountain, and were able to survey the country as far as about *long.* 46° E. It was mountainous in character, the mountains again bearing a great resemblance to the Ambas of Abyssinia, and attained its culminating point in the Richthofen Peak, about 5000 feet in height. Closely-packed ice covered the sea towards the south as far as the eye could reach, and rendered our prospects of a speedy return home by no means cheerful.

On the termination of this journey, Lieutenant Weyprecht measured a base-line on the ice near the ship, and we then considered that we had done everything in our power to accomplish the objects of the Expedition, and our thoughts were directed exclusively upon our return home.

The period immediately before starting was devoted to recruiting our strength. We took leave of the grave of our departed comrade, and of the country which the caprice of a floe of ice had enabled us to discover.

The conclusion of his narrative was given to the Meeting by Lieutenant Payer in a speech in his own language, of which the translation is as follows:—

On the 20th of May, in the evening, the flags were nailed to the masts—an affecting scene for all of us, and we started upon our return home. Our equipment was of the simplest, for circumstances forbade anything approaching to luxury, and, in addition to the clothes he wore upon his back, the personal property of each member of the Expedition was limited to a blanket to sleep in. The provisions, ammunition, &c., for three or four months were packed in three, subsequently four boats, placed on sleighs, and in three large sledges, each weighing about 17½ cwts. Only the two strongest of our dogs were alive by that time; but even this small contingent proved of great service, for they pulled daily 9 to 10 cwts. between them.

The deep snow which was encountered on first starting, compelled us to travel as many as five times over certain distances, for it required the united strength of our whole party to drag a single sledge or boat. Having reached the edge of the land-ice, we had to clamber with our boats and sledges from floe to floe, and sometimes to cross narrow fissures in the ice. Persistent southerly winds, moreover, destroyed the little progress we made, for they drove the ice, upon the surface of which we were travelling, to the north; and after two months of incessant labour, we were not more than eight miles from the ship. It almost appeared to us as if our struggle with the ice would end in a defeat, which would compel us to remain a third winter in our ship, uncheered by a ray of hope.

The ice around us was closely packed, and on several occasions we were compelled to lie quietly with our boats upon a floe of ice for an entire week, until it should please some channel to open. Northerly winds set in at length, on the 15th of July, which dispersed the ice to some extent, continuous rains reduced its dimensions, and by almost superhuman exertions we were advanced ten miles in the course of as many days. We were fully convinced by this time that no vessel would have succeeded in that year to reach the land discovered by us.

On the 7th of August we observed, for the first time, a swell coming from the south, an indication of the proximity of open water. This revived our fading hopes, which fell anew when we again became ice-bound for the space of five days; but on the 14th of August we reached the edge of the pack in lat. 77° 40′ N., and our safety seemed thus to be secured. Here we were reluctantly forced to abandon our sledges, and to kill our dogs, who had been our faithful companions and assistants in times of need, for our boats were hardly large enough to hold ourselves and baggage, besides which we were without water and provisions for their maintenance.

Our final salvation is due entirely to finding the edge of the pack-ice in so high a latitude, and, favoured by the wind, we crossed the open sea in the direction of Novaya Zemlya, and followed the coast of that island toward the south. On the 18th of August we, for the first time, placed our feet upon *terra firma*, near the Admiralty Peninsula; and on the evening of the 24th—that is, after a passage of ninety-six days—we found ourselves in the Bay of Downs (lat. 72° 40′), on board the Russian schooner *Nicolai* (Captain Feodor Voronin), who received us with that heartiness which distinguishes the Russian people.

A speedy passage brought us to Vardö, and at three o'clock in the afternoon of the 3rd of September, 1874, we stepped upon the hospitable soil of Norway, full of that satisfaction which an escape from a position of danger and doubt brings with it.

The PRESIDENT.—Before I call for remarks on this paper, I wish to read you a few sentences from a letter which has reached me to-day from the well-known geographer, Dr. Petermann, of Gotha. Formerly, Dr. Petermann was opposed to Smith's Sound as the best route for a North-Polar expedition, and advocated the superiority of the Spitzbergen route; but I am happy to see that he now admits the advantages of the Smith Sound route to be at least equal to those of the line to the East of Greenland.

The passage is as follows:—

"But whatever may be decided on, I trust that the British Government will no longer hold back to grant what all geographers and all scientific corporations of England have been begging for these ten long years, and afford the means for a new effective expedition to crown these our modest endeavours, of which I have given an outline. We in Germany and Austria have done our duty, and I am happy to have lived to see that our humble endeavours, the work of our Arctic explorers, have gained your approbation, that of the Royal Geographical Society of Great Britain. We have done all we could in the private manner we had to do it; for, as a nation, we Germans are only now beginning to turn our attention to nautical matters. We have had no vessels, no means, and our Government has had to fight three great wars these ten years. But nevertheless we have had in this interval German, Austrian, American, Swedish, Norwegian, Russian Polar Expeditions, in which even an Italian officer took part, at the instance of the Italian Government. And England, formerly always taking the lead in these matters, is almost the only maritime power that has kept aloof. When, nearly thirty years ago, one man of science proposed that magnetical observations should be extended, it was at once answered by the Government then by sending out to the Antarctic Regions an expedition of two vessels, the *Erebus* and *Terror*, under that great navigator Sir James Clarke Ross, which has never yet been eclipsed as to the importance of its results and the lustre it shed on the British Navy. I do not know the views held in England now, but I know that to us outsiders the achievements and work of a man like Sir James Clarke Ross or Livingstone have done more for the prestige of Great Britain than a march to Cumassi, that cost millions of pounds sterling. That great explorer, Livingstone, is no more; his work is going to be continued and finished by German and American explorers. We shall also certainly not let the Arctic work rest till it is fully accomplished; but it surely behoves Great Britain now to step in and once more to take the lead."

Admiral Sir E. BELCHER said he was quite sure that the feeling of Great Britain would be greatly in favour of sending out another Arctic Expedition. He would prefer the route by Smith's Sound, but at the same time would not renounce all attempts to the east of Spitzbergen. The officer appointed to command such an expedition ought to be wholly untrammelled in his course of action. There are many men in the British Navy quite equal to control such an undertaking, and no one could possibly lay down rules for their guidance until the opportunity arises for decisive action. He was perfectly satisfied that if in 1852, when he started up Queen's Channel, he had been free from that bugbear of raising piles and leaving documents behind, he could have passed into the Polar Sea and gone out by Behring Straits. He had then proceeded without the slightest difficulty to the further end of Wellington Channel; but he was persuaded to stop and build a cairn, and before he returned to the ship he found that the sea had closed in the whole strait. However, he took up his temporary winter quarters, expecting that the ice would have opened, and started in sledge-boats. When he reached Exmouth Island he suddenly found the whole floe between the spot blocked and the island break up, and an open sea again, with nothing to prevent the ship from passing through, had she only been a few hours earlier. Thus he found that there was an open sea, with a strong tidal course flowing east and west far north of the spot where he was shut in for the winter. The morning after, the whole floe for 18 miles between Exmouth and N. Cornwall was open, and he sailed across in his frail sledge-boat. The return tide brought back the ice, but it again opened, and he returned under canvas to Exmouth Island. On the 22nd May, 1853, the sea was again opened, and a boat then might have navigated the sea. It was supposed that that sea communicated with Smith's Sound. He was convinced that off the Spitzbergen shore similar opportunities would be found. The great thing was to attach the ship to a floe, *keep well off shore*, and avoid icebergs. A rendezvous should be fixed on, to which stores might be sent, and in this way, in the course of three years, results would be attained as glorious as those which Lieutenant Payer had accomplished.

In conclusion, Sir Edward moved a vote of thanks to Lieutenant Payer for his most valuable paper.

Admiral Collinson had no doubt that the Austrian voyage would always be celebrated for the discovery of the land, but it was also of great importance as throwing light upon the course of the flotation of the ice. Lieutenant Payer had met with an almost unprecedented instance of an Arctic current setting to the northward. Between Greenland and Behring Straits the whole drift was to the southward. Sir Edward Parry was prevented going northward by a southerly drift; then the *Hansa* drifted down to the south; the escape of the *Resolute* and the *Fox* testified to a similar drift; the *Erebus* and *Terror* were brought down by the current to the position where they were abandoned by their crews; and, in all probability, Sir John Franklin might have escaped had he tried to proceed inside King William's Land, which he would have done had he known it to be an island. In contradistinction to this concurrent testimony as to a southerly drift, Lieutenant Payer had found a drift in the opposite direction.* This remarkable change in the ocean drift was a fact

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* The following is the drift of the *Tegethoff* in the Polar Sea, from August 1872 to August 1873, computed by Capt. George, Map Curator R.G.S.:—

Date.	Drift.				Winds.
	Interval.	Direction.	Amount.	Daily Rate.	
	Days.		Miles.	Miles.	
From Aug. 21 to Sept. 9	19	N. 62° W.	28	1· 5	Easterly.
„ Sept. 9 to Oct. 1	22	N. 78° E.	74	3· 4	S.W. gale.
„ Oct. 1 to Jan. 15	186	N. 55° E.	123	1·15	
„ Jan. 15 to Feb. 25	41	N.	60	1· 5	
„ Feb. 25 to Aug. 30	186	N. 73° W.	148	0· 8	

which was deserving of careful inquiry. A similar drift existed in the Behring Straits. He believed that the packed ice prevented the frost getting to the surface of the water, there was no cohesion of the pieces together, and they were easily disturbed by any strong breeze of wind. Where the ice was open and exposed to the cold, it froze solidly, and there was great difficulty in moving it; but with the packed ice it was otherwise. He had looked upon Lieutenant Payer's voyage with a great deal of interest, and there could be no doubt that that young officer had deserved the medal which bore as its motto "*Ob terras reclusas.*"

Second Meeting, 23*rd November*, 1874.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Abd-Ell-Rasak Bey; James Allen, Esq.; W. J. Alt, Esq.; George Beall, Esq.; George Müller Beech, Esq.; Louis A. Bernays, Esq.; John Biddulph, Esq.; Capt. Lord de Blaquière*, R.N.; *Ambrose P. Boyson, Esq.; John Henry Brand, Esq.* (President of the Orange Free State Republic); *R. Dunlop Buchanan, Esq.; Capt. William S. Cooke* (22nd Regiment); *Baron de Cosson; Henry Nicholas Courtney, Esq.; Rear-Admiral Crawfurd; Capt. W. H. Duthie*, R.A.; *Benjamin Hill Evans, Esq.; Edmund Farmer, Esq.; Thomas Fenn, Esq.; F. Du Cane Godman, Esq.; Lieut. St. George C. Gore*, R.E.; *C. L. Griesbach, Esq.; Francis Gwynne, Esq.; Philip Hanmer, Esq.; William Hargreaves, Esq.; Commander James A. Heathcote* (late I.N.); *Henry Henderson, Esq.; His Excellency Baron Hochschild; Le Chevalier Frederic Jeppe; F. Killam, Esq.; Thomas Kincaid, Esq.; S. Koppel* (German Consul to the United States of Columbia); *Rev. W. L. Leeman; F. N. Macnamara, Esq.*, M.D. (Surgeon-Major Indian Army); *Rev. A. Gray Maitland; Hugh Matheson, Esq.; Capt. Hon. Paul Methuen; R. Leslie Morris, Esq.; Dr. C. F. Oldham* (Surgeon-Major Indian Army); *William Henry Overall, Esq.*, F.S.A.; *W. H. Paulson, Esq.*, B.A.; *Henry Pender, Esq.; Thomas Digby Pigott, Esq.; Thomas Platt, Esq.; Capt. Richards*, R.N.; *Rev. George St. Martin Ritchie; Hon. William Barnard Rhodes; Robert Russell, Esq.; Howard Saunders, Esq.*, F.Z.S.; *Vernon Rodolph Schalch; Gerald V. Seymour-Fitzgerald, Esq.; H. Stephens, Esq.; Henry Strousberg, jun., Esq.; Hon. N. J. R. Swart; William Trotter, Esq.; Charles Twite, Esq.; John Ward, Esq.; Rev. John Dundas Watherston; Foveaux Weiss; Rev. Watkin Herbert Williams.*

DONATIONS TO THE LIBRARY, 10TH TO 23RD NOVEMBER, 1874.—A Libertação des Raças de Cor, &c., 1873; by R. Armenio (*Author*). The Growth and Vicissitudes of Commerce, 1872; Technical, Industrial, and Trade Education, 1872; On Commercial Training, 1873; by Dr. John Yeats (*Author*). "How about Fiji?" 1874; by "R." (*Author, per Mr. Wheeler*). Reorganization of French Army: Précis of Speech of the Duc d'Audiffret Pasquier (*Intelligence Department, War Office*, 1874). Abstract of Reports of Surveys and other geographical operations in India for 1872–73 (*H.M. Secretary of State for India*). Cenni geologici sulle montagne Poste in prossimità al Giacimento di Antracite di Demonte, 1874; by Cav. G. Jervis (*Author*). Quaritch's General Catalogue of books, 1874 (*Publisher*). Memoria que el Ministro de Estado en el departamento de Marina presenta al Congreso Nacional de 1871, Santiago de Chile (*J. L. Palmer, Esq.*). Expédition Pertuiset à la Terre de Feu: Rapport envoyé aux Sociétés géographiques, 1874 (*M. Pertuiset*). Selections of papers regarding the Hill tracts between Assam and Burmah and on the Upper Brahmaputra, 1873; Selections from Records of Madras Government, Nos. XXXVI. and XXXVIII., 1874; Selections from Records of the Government of India, Foreign Department, Nos. CX. and CXII., 1874 (*The Indian Government*). Public Works Department, British Burma; Reclamation of Waste Land and Improvement of Communications, Part I., 1868 (*R. Gordon, Esq.*). 14 Photographs of Kafirs (*J. Coles, Esq.*, R.N.). Bolivia; extracts from a work written by Avelino Aramayo, 1874 (*Anon.*). And the usual current Periodicals and Publications of Societies, &c.

DONATIONS TO THE MAP-ROOM FROM 10TH TO 23RD NOVEMBER, 1874. —Four Maps of part of China, in Chinese characters, viz., 3 Rolls showing the Military Stations at the mouth of the Yang-tsze-Kiang; 1 Roll, a Map of the Province of Hupih, showing the rising of the Hin River. (*Dr. W. Lockhart*, F.R.C.S.). Map of the Fiji Islands. 2 copies. (*J. Wyld, Esq.*, F.R.G.S.). Admiralty Chart of the Polar Sea, coloured; showing the discoveries of Great Britain and other Countries. (*Capt. F. J. Evans, Hydrographer.*) Government Map of Mexico. By A. G. Cubas, Engineer. (*C. H. Ohlsen, Esq.*) Map showing the Explorations of E. Giles, Esq., in the interior of Australia. (*G. W. Goyder, Esq., Surveyor-General.*)

The PRESIDENT called attention to the number of new members whose names had been read over; this number—60—being the largest that had ever been elected at one meeting. He congratulated the Society on this proof of the high place it still held in public estimation, and regarded such an accession as an earnest of increased means of usefulness.

NEW POLAR EXPEDITION.

He then announced that he had two or three matters to lay before the meeting before proceeding to the business of the evening. At the last meeting, in reading his opening Address, he had alluded to a subject which was then under consideration,—that of a new Polar Expedition. At that time he was unable to say more than he did. He had subjected himself to blame in some quarters for not having endeavoured to obtain something like a direct answer from the First Lord of the Admiralty, who was present on the occasion, but he thought he was only acting discreetly in preserving silence. He had reason to believe that the present Board of Admiralty was favourable to the undertaking, as he believed the Board under the former Government to have been; but one could never be sure that the favourable Report of the Admiralty, or even the favourable view of the Prime Minister, might be sufficient to overcome the economical scruples of the Chancellor of the Exchequer: consequently, he thought it best to say nothing until the question was finally decided. A few days afterwards he received the following letter, which all present had probably seen in the newspapers, but which, as a matter of form, must be laid before the Society and placed on their records. It was dated 10, Downing Street, Whitehall, 17th November, and ran as follows:—

"DEAR SIR HENRY RAWLINSON,

"Her Majesty's Government have had under consideration the representations made by you on behalf of the Council of the Royal Geographical Society, the Council of the Royal Society, the British Association, and other eminent scientific bodies, in favour of a renewed Expedition, under the conduct of Government, to explore the region of the North Pole; and I have the honour to inform you that, having carefully weighed the reasons set forth in support of such an Expedition, the scientific advantages to be derived from it, its chances of success, as well as the importance of encouraging that spirit of maritime enterprise which has ever distinguished the English people, Her Majesty's Government have determined to lose no time in organising a suitable Expedition for the purposes in view.

"I remain yours faithfully,
"B. DISRAELI.

"*Major-General Sir Henry C. Rawlinson, K.C.B.,*
&c. &c. &c."

The President added that he was unable to inform the meeting of the exact measures which had been taken in pursuance of this letter, but the accounts in the daily papers he believed were accurate, which stated that Sir Leopold M'Clintock had visited several of the northern ports—Dundee, Aberdeen and Peterhead—with the view of examining ships accustomed to Arctic voyages, in order to select two or more for the purposes of this Expedition. Sir Leopold had returned to Portsmouth, and would, no doubt, make his report to the Government in due time. He was happy to congratulate the Society on the successful termination of the efforts that had been made by this and other Societies to bring about a new Polar Expedition. It was an Expedition in which the Royal Geographical Society had always taken the greatest interest, but it was as well that the Fellows and the public should know that the Society has nothing whatever to do with any of the subsidiary arrangements. The organisation of the Expedition would be entirely in the hands of the Admiralty, and all applications for employment on it should be addressed to them. He would only further say that, according to all reasonable calculation, if everything went well, the Expedition might be expected to leave our shores in the course of next spring, probably in the month of May.

Sir RUTHERFORD ALCOCK asked the indulgence of the meeting in departing from the usual order of proceedings. He was sure that all the Fellows had heard with great pleasure the announcement just made that at last Her Majesty's Government had taken a favourable view of the many reasons which existed for sending out another Expedition to the North Polar region.

He himself was recently in Vienna, when the Austrian people showed great enthusiasm in welcoming back the officers of the Austro-Hungarian Expedition, which had just returned. The letter from the President of the Royal Geographical Society, read at the meeting of the Austrian Geographical Society, was received with the greatest pleasure, and the news that the English Government had decided on sending out a new Expedition would awaken an echo of sincere joy in the Austrian capital. The emulation which existed was without any jealousy, for each nation was only striving how far it could contribute to the one great end. It had been said that the utility of such an Expedition was not very evident, but the truth was that no one could ever tell what would be the final result of scientific discovery. If the undertaking only served to stimulate the courage, daring, and boldness, and to keep up the chivalry that had always distinguished the British navy, that would be quite sufficient to most Englishmen; but when Galvani made his first discoveries in electricity, even the most scientific of that day, certainly, never imagined that they would be the source of the marine cable and the telegraphic wire. There could be no doubt that discoveries connected with magnetic science must result from a nearer approach to the Pole, and what those discoveries might lead to, in the way of practical utility, no one could possibly decide. His chief purpose in addressing the meeting, however, was to say that the Society was very much indebted to the President personally for the success of his efforts to bring about a new Polar Expedition. Sir Henry Rawlinson had never been discouraged or disheartened, and had never ceased to take a deep interest in the subject, and, in the end, his courage and perseverance had been rewarded by complete success. He therefore proposed that the thanks and congratulations of this Society be offered to Sir Henry Rawlinson, as President of the Royal Geographical Society, for his successful efforts in obtaining from Her Majesty's Government a favourable consideration of the proposals for another Expedition to the North Pole.

Admiral Sherard Osborn seconded the motion. No one connected with the Council of the Royal Geographical Society for the last few years, knew more intimately than he himself did, or appreciated more highly, the exertions, tact, and discretion with which Sir Henry Rawlinson had acted; and he was sure the Fellows of the Society would join him in hoping that, as they were now able to congratulate their President on the result of the efforts of a considerable number of years, and on the going forth of the Expedition, so he might be in the same place to receive their congratulations on its return, which he (Admiral Osborn) believed would be a glorious one.

The President thanked the meeting for their kind vote, and in doing so said that, if any honour were due for what had been done, he must be allowed to share it with his predecessor, Sir Bartle Frere, through whom the matter had been brought exhaustively before the Government.

There were one or two other matters which he wished to notice before proceeding to the business of the evening. News had that day been received from Colonel Gordon, to the effect that he was at Gondokoro on the 5th September, and that he then had the sections of his steamer, destined to navigate Albert Nyanza, at Mount Regiaf below the Falls, having full confidence of getting them transported to the smooth waters of the Upper Nile beyond the Falls, in a fortnight from that time. A packet had also just been received, containing a journal and map from Mr. Stanley on the East Coast of Africa. It appeared that he had ascended the Rufiji River to a certain distance, and had sent home a map of its delta with a full account of his journey, which would, he believed, be published in the 'Daily Telegraph' of the following morning.

The real business of the evening to which he would now advert related to a subject of very great importance. Her Colonial Empire was one of the chief sources of the greatness and strength and glory of England, and it was impossible to overrate the importance to this country of the great continent of Australia. When the Royal Geographical Society was first instituted, forty years ago, nothing was known of Australia except a few square miles in the vicinity of the chief towns; but at the present time scarcely any part of it had not been visited. Of late the great object had been to discover fresh pasture lands for sheep-feeding. It was a most important feat when Macdouall Stuart crossed the continent from the south to the north along the line where the telegraph now runs. This was in 1859, and since then the great desire of explorers had been to traverse the intermediate country between Stuart's route and the West Coast.

In the course of the last thirty years, on no less than ten different occasions the Society's Gold Medal had been awarded to geographers for explorations in Australia. Mr. Eyre received the medal in 1843; it was next awarded to Count Strzelecki, who was the real discoverer of the gold deposits of Australia; next, to Captain Charles Sturt, to whom geographers were very greatly indebted, and Dr. Leichhardt. Mr. Augustus Gregory received the medal in 1857, and Mr. Macdouall Stuart in 1861, he having been presented with a gold watch for his previous exploration in 1859. The medal was awarded to the unfortunate O'Hara Burke, after his death, in 1862; and Mr. John King, who was with him, received a gold watch. Mr. Frank Gregory received a medal in 1863, and the list was closed with the name of Colonel Warburton, who had been awarded the medal this year, and to whose indomitable energy, perseverance, and capacity for personal endurance, it was mainly owing that his expedition was finally successful.

Journey across the Western Interior of Australia.

Colonel P. Egerton Warburton spoke as follows:—Mr. President and gentlemen of the Royal Geographical Society: My first duty is to return my sincere thanks to the Society for the honour they have done me in presenting me with their gold medal. I need not dwell upon the gratification which that presentation afforded to me personally and to my numerous circle of friends; but I may say that I think and I hope that it will act as an incentive to others in Australia to do far more than has been already done. Though last on the list of those who have been honoured with the Society's medal, I am, I think, the second from South Australia who has received it, the only one previously being John Macdouall Stuart, of whose name all South Australians are justly proud, for he accomplished a most wonderful feat. In what I have to say I hope I shall not be accused of boasting, when I assure you that the journey we went through was well nigh proving too hard for us. It was by the merciful interposition of Providence alone that our lives were saved—but there was nothing whatever to spare. We got off with our lives, and our lives only; and therefore all boasting or vain-glory would be absurd. We had to start from "Alice Springs," in very near the centre of Australia, and having once started, we were not permitted, nor, I believe, did any of us wish, to look back. We had no fresh horses, no fresh camels, no fresh provisions, nothing at all to help us. Our first start was our last start. I am very sorry to say I have not my journal here, and am obliged to trust to a few heads of notes to help a bad memory, and I scarcely know what subjects will be most acceptable to the Meeting.

There are, no doubt, a great many misapprehensions entertained in England with regard to Australian things. I gather this from the fact that, in conversation with me, one gentleman, endeavouring to obtain information, supposed I had not met with many navigable rivers. I think that was pretty well. Another gentleman supposed that, though our provisions failed, no doubt we had plenty of beer and wine; but the deepest of all cuts was when a young gentleman supposed that I had a guide to show me the way across. I need not dwell upon these little matters, for no doubt you will readily see that they were very great misapprehensions; but, on the other hand, I must remark that either the physical geography of Australia has such very peculiar features that no language could be found to describe them, or else that we Australians are particularly happy in giving misnomers to everything. For instance, it is common for us to talk of dry creeks. We have rivers without any water in them. We have very large lakes, over the dry beds of which the dust is blowing; and I see by the papers in Mr. Ross's report, alluded to by Sir Henry Rawlinson, that he fell in with a great many pools, but they had no water: so that, of course, we have a great deal to answer for with regard to the misapprehensions entertained in England.

Perhaps you are aware that the distance from Adelaide to Alice Springs is, in round numbers, about 1100 miles. We sent on our camels and the bulk of our provisions ahead, while myself and two companions—my eldest son and Mr. Lewis—followed on horseback, the horses carrying provisions for ourselves. We had a very pleasant ride, and experienced no difficulties. We followed the track of the Telegraph line and got to Alice Springs about the end of December. On my arrival there, I was assured by everybody who was acquainted with the country that it was utterly impossible for me to start then, because in the course of a fortnight, at the furthest, the summer tropical rains would be sure to fall; and that, as they lasted for three months with very little intermission, the ground would become so very boggy that neither horse, camel, nor anything at all, could traverse it; and that, if I did start, I should only be able to go a very short distance, and then have to stop. Not being acquainted with the country myself, I was obliged, of course, to follow this advice; and therefore I had to send some of my party back to Adelaide, to get a new supply of stores to meet the expenditure at Alice Springs. It so happens that exploring expeditions in Australia are almost always started in seasons of drought. Why such seasons are selected, I do not know, yet so it is; and I waited there for nearly four months, and no rain at all fell: but as I had detached some of my party, I was compelled to wait until they returned. I had, therefore, the pleasure of spending the tropical summer under a bit of calico, with nothing to do, and the thermometer at 110°. On the 15th April we were enabled to start, and so long as we continued to the north of the McDonnell Ranges we had very pleasant work. Water was to be got without any great difficulty; there was grass and bushes, and everything that we liked—in fact, it was what we call a good country. By that expression I do not mean good, fat, arable land, but country that would just carry stock, with some water and some grass. The McDonnell Ranges extend to two hundred miles, and as soon as we got clear of them our difficulties began. The water failed, the grass turned into spinifex, and the soil turned into sand; so that we were compelled to use all our wits to get on at all. The first portion of our journey after we left the McDonnell Range was not, however, so bad as the last portion. There is water, but Europeans—or at any rate we—could not find it. It is met with in very small holes made by the natives in the sand. There are but few natives there, and they get out about a jug of water at a time; but, of course, as we started with 17 camels, to water them all required rather more than a black fellow wants to drink. When we were fortunate enough to find one of these holes, we therefore had to dig out the well. The natives gave us very much trouble, because they did not like us; they were afraid of us, and we never could succeed in catching one, which we wanted to do, in order that by keeping him without water he might be compelled to show us where it was to be got. They were, however, too clever for us, and too quick for us. They saw us before we could see them, and they escaped. We did, on one occasion, manage to catch an urchin and put him on a camel; but he either was so frightened as not to show his fright or he was not frightened at all, for he did not appear to care much about it. We found water without him, and therefore let him go, and he crept away like a fox, thinking he had escaped from us and that we wanted to keep him—when we did not. On another occasion we caught a young girl about 17, and, barbarous as it may seem, I must tell you that we tied her by a good thick hair-rope to a tree; but she gnawed the rope through with her teeth and escaped us.

What was more, she ran away upon her toes, so that we could not track her much; and though I immediately put as good trackers as any in Australia on her trail, yet we failed to catch her again. The only other native that we succeeded in catching was a terrible old witch—hideous beyond all conception, and noisy enough to do anything. Having been cheated by the young girl, we thought to make quite sure of the old woman, so we tied her thumbs behind her back, and put a rope around her neck; but notwithstanding this, we were obliged to keep watch over her by turns during the whole night. I tell you this to show how excessively cunning they are; and we did not get any good out of any of them.

Perhaps the state of the natives might be a little interesting to you. They are, I think, the very lowest in the scale of humanity, and I cannot conceive how anything could fall much lower. They do not even take the trouble to put a few bushes up to shelter themselves from the sun or the rain—when it does rain, though I don't know when, for I didn't see it—but the sun is hot enough. They get on the shady side of a bush when the sun is too hot for them, and when it rains I suppose they go to the lee side. The gentlemen take the shank bone, about 9 inches long, of the wallabi—a kind of marsupial hare—and when it is lubricated nicely in the mouth they pass it through the cartilage of the nose, and it sticks out; and having done that, they are in full dress. I do not know anything more that is wanted. Of the ladies' dress I say nothing, and for this simple reason, that there is nothing at all to say anything about!

Another subject that perhaps may interest you is to be found in the camels. Most surely no other animal in creation could have carried us across. For hundreds of miles there was not a blade of grass, nothing that any animal, bullock, donkey, horse, could possibly feed upon; nothing but the tops of the bushes which the camels managed to browse. No animal but the camel could have served our turn. I say this with confidence, because every other animal which has been tried has failed, and this is the sixth expedition. These camels are most patient and easily managed, but it is generally requisite to have a master amongst them. There is one master, a bull-camel, who always establishes himself at the head of the party; and so long as he is in good spirits and able to move about, all the younger ones are kept in admirable order; but directly he falls sick, they become exceedingly troublesome. Amongst other misfortunes, we were unlucky enough to have our master-bull eat something that disagreed with him, and we had no medicine to give him except a chance bottle of mustard. It did not do him any good; but before we ourselves were aware that this master-bull was at all sick, the young bulls were all acquainted with it and were jumping about in most lively style. The necessity of having a comptroller, a President over the camels, will be apparent when I tell you that the trick the young ones have is to cut off two or three female camels and run them away as hard as they can; so that we were obliged to knee-halter them and tie them as tight as we could, or else we should have left our bones in the sand, because all our camels would have run away from us in little troops. However, they certainly behaved well to us when we did not give them the opportunity of doing the reverse.

Perhaps you would like to learn, too, what sort of eating they make. Unfortunately, we had to eat seven of them. I daresay when the animal is fat and well fed on oilcake and other things, it cannot be very bad; but when he has been worked to that extent that he is unable to stand, and is shot only because it would be a pity to leave him to rot, his meat is not very good, and it is interlaced with large sheets of parchment. He looks a very large animal, but there is very little meat on him. He is more bone than anything else; and I can assure you that of all the buckets of meat—for the bucket was our cooking-vessel—that we cooked when a camel was killed, never, in any single instance that I can remember, was there one single bubble of grease on the surface. The head is somewhat of a delicacy, and the feet are really very good, for his condition does not affect his feet very much. In our distress, however, we were obliged to eat him, inside and outside too; and his hide is pretty good when you cannot get anything else: but if anybody here has had the boldness to taste the contents of a carpenter's glue-pot, it comes to very much the same thing. We were compelled, by absolute starvation, to eat our last camel all but the hair—clean through from end to end; and after the bones had been lying in the sand some days, they were broken up to make broth of, and, in the course of a short time, I don't think any of the animal was to be seen. The advantage of the camel is, that he can work until he cannot work any longer, and then you can eat him.

Perhaps one of our greatest misfortunes connected with the camels was, that a good many of them were struck with the land-wind at night in the loins, so that when we got up at three or four o'clock in the morning it was reported that this camel or that camel could not move. Of course every camel we lost was a reduction—and a very considerable one—in the chance of our saving our lives; and, therefore, such an accident would be a thing to be guarded against in future by covering the camels. When it was too late we took the precaution; but many of our camels were dead or ruined before we knew anything at all about it. No Australian bushman ever thinks himself badly off if he has a quart pot, a blanket for himself, a pair of hobbles for his horse, and a little flour, tea, sugar, and tobacco for provisions. Our lives depended on the welfare of the camels, and whenever a camel even looked sick our march was delayed; for, though hunger pressed us on, we were compelled to sit down until that camel got well—then our provisions were consumed to a considerable extent in idleness on our part waiting to restore the camels, because we dared not go on while the camel was ailing. I took six months' provisions with me, but that turned out to be too little, though I do not think I am much to blame for it, because my calculations were based on a certain distance, and I allowed for detentions and digressions; but the detentions were so frequent and great that we ran short of provisions, and at the end we had no flour, no tea, no sugar. The only thing we had was the miserable meat scraped off the bones of a half-dead camel, and put on the bushes and dried in the sun. We had that, and nothing whatever with it. It will, therefore, be readily understood that we did not grow fat or gain much strength. Whilst the camels were tolerably good we were able to travel during the daytime, and therefore, of course, had the use of our eyes and the chance of finding water by running up native tracks; but when the summer began, that is, about September—when our provisions ran short and our camels began to fail—the heat became so excessive that we dared not travel through the day. The camels would have been knocked up in the course of two days, and we would have been left in the desert. We were therefore compelled to travel in the dark, when it was a little cooler, and the consequence was, that we were cut off from our chance of finding water during our march. When we came to our halt for the day the camels were so tired that we were unable to go out and look about us. Not only were we thus compelled to seek our rest in the daytime, but the greatest annoyance perhaps of all was caused by those little insignificant insects, the ants: they gave us no peace. It was impossible to go on the shady side of the bush without being immediately covered. We could not sit down or attempt to write or make any calculations without being literally covered with these creatures. We had to travel all night and we could not sleep in the day, which was another thing that caused us to fall into such a miserable state. When our hopes became rather depressed, the best thing we thought we could do was to stay some time at one place where there was water, recruit our camels as much as possible, and then risk all upon a final rush to reach the Oakover River, where we were sure of water. It was a subject of very much deliberation with me, and of great anxiety. Of course, it was neck or nothing. The distance was about 160 or 170 miles, and if the camels could reach that distance, well and good; if they could not, we should fall. But there was no alternative. We could not sit down there and starve, and we thought we might as well die in going as in sitting still. But we were unable to do that; and but for the interposition of Providence in bringing us on two occasions to water, we certainly never could have got through it. Water was found by our companion, Charley—a black fellow, whom we took with us from Alice Springs, and a very good boy he was. One morning he left us without saying a word. None of us knew where he was. We were greatly alarmed, for he was a favourite. I was in great perplexity at his non-return. There were six of us there. It was death to stay, and it seemed a most cruel and inhuman thing to leave the poor lad. We, therefore, did not know what to do, and, as a compromise, I stayed two or three hours, and at nine o'clock, whether he came or not, I decided that we must go. He did not come, and we started; we had bells on our camels' necks to make a little noise, and in the middle of the night, about eleven or twelve o'clock, we heard what in Australia is called a cooeey—a voice calling to us—and we were inexpressibly delighted to find our black boy cheerily turn up. He came at right angles upon us. It is evident that had we started off an hour later he would have crossed our track and missed us. Had we been at all earlier we should have passed the point, and he would have gone behind us. It was too dark to see our tracks, but it so happened under Providential dispensation that we exactly cut each other. He had been to a native camp, and had got information about water; so we immediately sat down and drank all that we had with us, and then we went on to the new supply, and that gave us a fresh start. On a subsequent occasion the poor lad—as he was willing to go single-handed to a native camp, we keeping the animals and the rest of the party out of sight so that the natives might not be alarmed—was treated very kindly, and they gave him water, he, no doubt, thinking that the negotiation was amicably settled; but the instant they saw the camels they were, I suppose, frightened, and imagined that some treachery was intended against them, so they put one spear through his back and another through his arm, and hit him a blow on the head that would have split half-a-dozen European skulls, and they nearly broke his jaw. Of course we rescued him, and the natives were driven off as soon as the camels could come up. The lad, I am happy to say, recovered, and he is now in my house in Australia—or was there—doing exceedingly well. I do not know whether you are aware of it—it may seem a very trifling thing,—but a black fellow's skull is about five times the thickness of a European's. It really is. I do not mean as to his intelligence, for there I dare say he is as sharp as any of us, but I mean in actual thickness; and unless it were so, I do not know how he could possibly sustain the blows with most massive clubs that are administered on his head.

I never had the pleasure of seeing one of the women's skulls; but I imagine that they must be even thicker than the men's, for they have to endure even more blows.

I must not trespass longer upon your time, except to give you a faint description of our miserable condition just at the last. We had succeeded in our object; we had traversed the whole of the unknown country, and were located on Frank Gregory's furthest point, on the Oakover. We had reached that water by a miserable night march, in which I, being somewhat too old for the work, was obliged to be strapped to the back of a camel, because I could neither sit nor stand. We reached that point, but were not able to go any further. We had eaten the greater part of our camels, and had only three left. One could not work at all, and the question with us was how we were to get from that point to a station which we thought existed somewhere on the De Grey, though we did not know where. It turned out that this station was 170 miles away from us. We had no beasts to carry us; we were utterly unable to walk 100 yards; and therefore it was quite clear we could not have got down in the ordinary way. I therefore took the two camels that were tolerably capable of work, and sent the two strongest of our party down the river to look for the station, and to endeavour, as a last resource, to procure some provisions, and beasts to carry us. During their absence we lay there on the bank of the Oakover, which at that time had not a drop of water in it. We had, however, a water-hole separate from the river. We lay there for a great many days, not knowing when our party would come back. Sometimes we caught a bird, and there were plenty of fish in the water-hole close by our side. We had hooks and lines, but they would not bite, and we had no net; so we saw the fish, and knew they were there, whilst we were starving. There were also plenty of ducks about, but they would not settle on that water where we were, and we could not walk after them, though we had powder and shot. Day by day we went down for bathing, but for nothing else; and we were being cruelly starved to death. To show you what changes are met with in Australia, I may mention that the bed of the Oakover at that point was 300 or 400 yards in width; but there was not a drop of water in it, and probably there had not been for a long time. We went to bed one night, when the channel of the river was quite empty, but at 3 o'clock in the morning it was full to the bank, with plenty of ducks and large trees, borne along by the current, floating on its surface. It was then a splendid river. The party that I had sent down behaved admirably. They reached Messrs. Grant, Harper, and Anderson's station, where they were received with the greatest kindness. Horses and provisions were at once supplied, and to the liberality and promptitude of these gentlemen we entirely owe our lives. Not only did we receive such kindness from individuals, but we were treated in the same manner by every community we passed through. We were regarded by the Government as guests of Western Australia from the moment we set foot on the inhabited parts. We were franked back to our own shores, close to the seaport of Adelaide; and I owe the authorities a very great debt of gratitude, which I take this opportunity of expressing. If there be any point upon which I have failed to make myself understood, I shall be happy to give explanations, if Sir Henry will kindly tell me what the Meeting would most like to hear.

Sir Charles Nicholson asked Colonel Warburton to give some details as to the vegetation and geology of the country through which he had passed. The region traversed by Macdouall Stuart was of the most unpromising kind, and he was frequently in danger of perishing for want of water. Burke and Wills died of starvation in a country now occupied by sheep-runs, and which possessed all the physical conditions necessary for supplying human wants. He therefore wished to ask Colonel Warburton, if, notwithstanding the barren character of the country which he had passed through, he thought it possible that in time portions of it might not be made available for pasturage?

Colonel Egerton Warburton replied: Unfortunately I am neither a geologist nor a botanist, and therefore cannot give any scientific account of the matter; but certainly a great part of the country which Stuart went over, so far as the south of Alice Springs is concerned, is most excellent pasturage country, with plenty of water and good grass all along the Stephenson. Around Alice Springs there are now cattle-stations, and to the north of the McDonnell ranges the country is fit for stock. That celebrated explorer Sturt had a theory that the centre of Australia was a depressed basin. Unfortunately my barometer—and I had only one—went wrong; and as I did not know when it went wrong, I cannot tell up to what date its readings were to be trusted, though they were taken carefully every day. The foot of the McDonnell Range is about 2700 or 3000 feet above the level of the sea. Neither I nor any of my party was sensible of any descent on the north side, and I think the part I traversed is high sandy tableland, and certainly I should say that none of that land is likely to be occupied for a great many generations. Nothing but the direst necessity could ever induce a man to go there; for, in the first place, he would have to introduce some kind of grass, and he would have to carry for an immense distance every single article of food that he required, except meat. There are no animals there—not even a wild dog. There is no water. I got the bones of a dog out of one well, but that only showed what a silly dog he was to go there. There is no animal except the wallaby, which can do without water. I can assure you that when we killed a camel there was not a single kite or bird of any kind that had the curiosity to come and see what we were doing. The natives live on this little wallaby. They burn the spinifex grass, and the instant the wallaby comes out they shoot it with a short stick. Besides the wallaby they may catch a snake or lizard.

Mr. Bell asked whether there were any kangaroos?

Colonel Egerton Warburton.—Neither kangaroos nor emus, nor any single animal of any utility. I have seen the wallabies in the hands of the natives, but I never saw one on the ground.

Sir George Campbell asked what the natives fed on?

Colonel Egerton Warburton.—There is a small acacia-seed, which is very black and as hard as a little bit of granite, and on these the natives feed also—it is their vegetable diet; and we ate them, roasting them on a tin-plate, and then cracking them up, sometimes between two stones, and sometimes with our teeth. There were plenty of casuarina-trees, and a tree called the Leichhardt or walnut-tree; but its fruit is harder than stones, and cannot be eaten.

Mr. Francis Galton asked Colonel Warburton if the natives had been troublesome on many occasions?

Colonel Egerton Warburton.—Only on one occasion: I was on foot, and got out of the track. The camels were coming behind me, and hearing a little noise I looked round, and found nine natives with spears close to me. Two of them, young men, in order to show their zeal for the work, had their spears poised to throw at me; but, as reports travel great distances out there, I suppose they had heard of the wonderful effects of firearms, and when I advanced on them with my pistol they lowered their spears. There were a few old men amongst them, and by dint of passing our hands over each other's grey beards, to see that they were not tied on, we got on amicably. That was the only time I met them. They were afraid of us, and ran away from us. We caught an urchin once; but it was by chasing a mother, who had this child and an infant on her back. The camel, not liking to be separated from its fellows, bellowed frightfully, and this alarmed her so that she dropped the big child and ran off with the little one.

Mr. Woods asked what were the physical and geological features of the country passed through, and if a sandy desert prevailed for the greater part?

Colonel Egerton Warburton.—I think the last water we passed was about Ethel Creek. There are no mountains, only high sand-ridges, varying in height from 40 to 50 and even 100 feet, running in parallel lines, so that when you are riding between them you can see nothing at all. When you get to the top of them you can only see the next sand-ridge.

Mr. Rusden asked what was the height of the casuarina and other trees, and, if they were so numerous that, when looked at from the distance, they had the appearance of forests? In looking from one hill to the trees on another, for instance, did the hill looked at present the appearance of a wood or forest?

Colonel Warburton.—We passed through several what I may call casuarina forests, but they were all on the low ground. I should think the trees must have been about 30 feet high, with straight stems without branches, admirably adapted for telegraph-posts, if there were any means of getting at them.

The PRESIDENT said that he had omitted any reference to Mr. Hamilton Hume, whose services the Society greatly appreciated, because he was not a gold medallist, and in the list he had given he only referred to those who had received the Society's medal. The Society ought also to take notice of the liberality of the two gentlemen, the Hon. Mr. Elder and Mr. Hughes, private citizens of Australia, who organised the expedition at their own expense. The cause of geography was very much indebted to them. It was important, too, to remember that, wherever the central region had been tapped, the same results had been obtained. Mr. Gosse, Mr. Giles, and the Forrests had all arrived at just the same conclusion as Colonel Warburton, that the country was absolutely uninhabitable. Colonel Warburton richly deserved the medal which had been awarded him. He had displayed extraordinary personal energy and endurance, and, in the name of the Society, he (the President) thanked him for the pleasure he had afforded the Meeting by his description of his journey, wishing him at the same time health and happiness when he returned to Australia.

Mention was made by the President of the various other Expeditions to the Interior of Western Australia, of which the following brief accounts have been communicated to the Society.

Mr. W. C. Gosse's Explorations, 1873.

Mr. Gosse gives the following summary of his Journey, in the introduction to his Report and Diary addressed to the Surveyor-General of South Australia:—

"SIR, "February 1st, 1874.

"I have the honour to enclose, for the information of the Honourable the Commissioner of Crown Lands and Immigration, the diary and map of my exploration; also to report that, leaving the Alice Springs, April 21st, with a party consisting of four white men, three Affghans, and a black boy, I travelled along the telegraph line to latitude 22° 28′ s., about forty miles south of Central Mount Stuart.

"From this point I followed the Reynolds Range about W.N.W. for forty-five miles; I was then obliged to turn S.W., passing a high bluff, piled by Major Warburton, and on to the western extremity of the MacDonnell Ranges (Giles's Mount Liebig).

"Here I was compelled to turn south, crossing Mr. Giles's track several times, the eastern arm of his Lake Amadeus, and on to a high hill, east of Mount Olga, which I named Ayers's Rock (I have given a full account of this wonderful feature, in my diary). The country to this point is chiefly sandy soil, densely timbered with mulga (a name given to small trees found numerous in the interior of Australia, a species of genus acacia, belonging to the natural order *Leyuminosæ*), or stretches of spinifex sandhills. In the vicinity of the lake the sandhills are higher, and very few small patches of mulga, nothing fit for occupation. I found a spring at Ayers's Rock—the first permanent water seen since leaving Alice Springs, but the good country very limited, not more than thirty square miles.

"Proceeding west and south-west, I passed nothing worthy of note, until I reached high ranges on the northern boundary of South Australia (the Mann). The waters here, as far as I could judge, had every appearance of being permanent, and the country equal to anything in the nerth. This strip, about eight miles wide, extends to the boundary of Western Australia, and is well adapted for stock. From here to my furthest point, latitude 26° 32′ S., longitude 126° 59′ E., the country is poor, getting worse as I advanced, until I got clear of all ranges, and into spinifex and sandhills, and dense mulga flats, destitute of water. I was reluctantly obliged to commence my return on September 22nd, retracing my track to where I first struck the Mann Ranges, then along the south side, the same rich flats still continuing. From here, going east, I made the high range seen from Ayers's Rock, and named the Musgrave. There is a greater extent of good country in these ranges, averaging about twenty miles in width, and 100 long, but the waters getting scarce towards the eastern end. In latitude 26° 9′ S., longitude 132° 50′ E., I struck the head of a large creek, which turned out to be the Alberga. This is very badly watered: indeed, from the east end of the Musgrave Ranges to the telegraph line, there is scarcely a water to be depended upon. This must always be a great drawback to the occupation of the good country. I found, upon reaching the telegraph line, that this had been an exceptionally dry season—waters that were considered permanent having been dry for months. It is impossible to say what alteration a good fall of rain might make, but I do not think a practicable route will ever be found between the lower part of Western Australia and the telegraph line. I pushed my exploration as far west as I could, and when I commenced my return had barely sufficient stores left to carry party to the telegraph line.

"I have the honour, &c.,

"W. S. Gosse,

"Leader of C. & W. Exploring Expedition.

"*To the Surveyor-General.*"

"Forwarded to the Secretary, Crown Lands Office, for perusal of the Hon. Commissioner, with diary, plans, and specimens of roots and plants. From the specimens submitted, the country traversed appears to be mostly granitic, and to partake of the character of one desert, with oasis between, and where decomposition of mica and felspar has accompanied disintegration.

"Although the Expedition has not effected the passage to Perth, it has placed in possession of the Department, detail of over 60,000 square miles of country, and enabled the places named by Mr. Giles to be correctly laid down as to latitude and longitude. I can speak highly of the way in which the records have been kept, and of the admirably constructed plans accompanying Mr. Gosse's journal.

"Feb. 5th, 1874." "G. W. GOYDER, Surveyor-General.

Mr. Giles's Second Expedition.

LETTER from DR. FERDINAND VON MUELLER.

"Melbourne, 10th August, 1874.

"BY last month's mail I forwarded to you a brief note concerning the results of Mr. Giles's second expedition; but as I received the first telegram only on the eve of the post departure from Lady Charlotte's Water, it is only now that I can give the Royal Geographical Society some more extended information on Mr. Giles's movements; and even these data will still be brief, inasmuch as the brave explorer has not yet reached the settlements of the south, although he will likely soon be in Adelaide. At my request, his map was sent off two or three weeks ago to the Surveyor-General of South Australia, Mr. Goyder; but you can be placed in possession of a tracing or print only by next mail, when it is likely the diary will also have found its way to publicity. Suffice it now to say that Mr. Giles, though he was unprovided with camels, advanced, while encountering a season of extreme drought, to the 125th degree of E. longitude, and this on *two points about* 100 *miles apart*, and in the latitude of Shark's Bay. At the most northern of these two positions he sighted in the far western distance a range, which doubtless would have led him onward to the broken tableland, in which the rivers Murchison, Gascoyne, Ashburton, Fortescue, and Grey arise, had he not been forced, by a very sad calamity, at this juncture to retreat,—one of his faithful companions, Mr. Gibson, losing his way and perishing in the desert, an event which casts great gloom on an otherwise brilliant enterprise. The danger of straying is always great, but particularly so in a desert without landmarks, and with a uniform sameness for many miles all around, while the view is shut out to any distance by sand-ridges.

It was only after all his horses had died of thirst, that Giles fell back upon his camp at a distance of 100 miles, having to walk the whole length through a sandy desert covered with pungent Triodia (*T. irritans*, R. Br., *Festuca irritans*, F. v. M.), carrying some water in a keg with him. Having then only two companions left, the whole party having at starting consisted of four, he had to abandon his attempts to penetrate further westward, although fully half-way across from the central part of the overland telegraph line to the west coast. Indeed, in all probability, his journey to the west shores would have been less laborious than his return travel, as it is reasonable to suppose that the tablelands and ranges east of Shark's Bay would send waters as drainage to the east on their inland slopes, in the reach of which Mr. Giles must soon have come. He discovered and traversed, however, *four* distinct systems of *ranges*, irrespective of the mountains seen by him beyond the 125th meridian; but one of these ranges was subsequently also discovered by Mr. Gosse, who saw Mr. Giles's track there, when the Adelaide explorer, in his able exploit, diverged from his intended line in a latitude north of McDonnell's Range, to the latitudes chosen by Mr. Giles for his operations. Mr. Gosse, leaving off in longitude 127° E., came earlier back to the settlements than the Victorian explorer, and thus enjoyed priority in recording the discovery. On my request, one of the ranges will be named in honour of her Imperial Highness the Princess Marie, as it was discovered about the time of the celebration of the princess's marriage, to which auspicious event thus a geographic and lasting monument will be raised in Her Majesty's territory.

"In disclosing such a vast extent of territory in the central regions of Australia, Mr. Giles has paved the way for overland communication from the remotest inland settlements of South Australia, New South Wales, and Queensland, to the harbours of the west coast; and for occupation of the extensive inland tracts of West Australia, for pastoral, and doubtless, in many instances also, mineral purposes. When once a few watering-places, although in the first instance widely apart, are rendered known to steer for, then those who follow the steps of the geographic pioneers can easily diverge to promising places for further search of water, so as to shorten the stages of moving stock from camp to camp. Mr. Giles was out twelve months in the wilderness, short of a few days. Numerous oases will yet be found in the deserts, if even that appellation ought to be applied to the wide extent of the more central regions of Australia as a whole. Other generations will see marvellous changes in these supposed deserts by the dissemination of perennial grasses, clovers, lucerne, and numerous other fodder herbs, and by draining into permanent basins the moisture which now, after occasional rainfalls, so rapidly evaporates. And this brings to my mind that, several years ago, I have over and over advised (see 'Bulletin de la Société d'Agriculture d'Alger,' &c., &c.) the desirability of caravans taking seeds of Australian acacias and eucalypti, together with seeds of perennial grasses and pastoral herbs, for dissemination during the cool season into the deserts of Africa; a splendid opportunity for the purpose, namely, when Gerhard Rohlfs crossed the Lybian Desert, having apparently been lost.

"Mr. Giles's expeditions were both supported by private means, and were planned by myself; but the second enjoyed from the South Australian Government a generous and disinterested support, by a reward being given for the discoveries of the first enterprise. I think it may also fairly be said in favour of the undaunted and talented explorer Giles, that his first journey called forth those of Colonel Warburton, who late in life so gallantly entered the arena of exploration; and also those of Mr. Gosse and Mr. Ross, the latter of whom has also just returned, finding it impossible, even with dromedaries, to cope with the acacia scrubs of the western inland regions of Australia. And, more, I can say of my Victorian exploring friend, that the indication of the various permanent waters on the map of his first expedition will greatly facilitate Mr. Forrest's movements from the sources of the Murchison River eastward. But exploration should not cease here. We ought not to rest until all the wide inland tracts of Her Majesty's Australian territory are mapped, and thus opened for settlements to her subjects, with resources of prosperity as yet but imperfectly understood or foreseen. Since the last quarter of a century I have left no means at my command unemployed to help fostering enthusiasm here for geographic progress; and it is to me a source of some honest pride when I now cast a glance on the map of the Australian continent, and compare it with that of the time when I made Australia my permanent home. But still there remains yet much to be done by men of endurance, skill, and courage. All the country intervening between the tableland at the back of Shark's Bay, King's Sound, Cambridge Gulf, and the rich and healthy basaltic undulations of Sturt's Creek (where I was with Gregory in 1856) still requires exploration; while other most gloriously promising fields of research stretch from our overland telegraph line eastward to M'Kinlay's range, and other magnificent tracts of country on the western limits of Queensland, to all of which the establishment of the trans-continental telegraph stations give *now* a comparatively safe and easy access. It is in these regions, also, where the unburied bones of Dr. Leichhardt and his companions probably lie bleaching in the wilderness.

"FERD. VON MUELLER.

"*Lieut.-Gen. Sir Henry Rawlinson,* K.C.B.,
"*President of the Royal Geographical Society, &c.*"

"*Postscript.*—I would add that Mr. Giles was *nine times attacked* by the natives, probably in the combat for water, and that, on one occasion, he was dragged by the savages and severely wounded.

"We have in Australia not yet the desert breed of camels; *i.e.*, such wonderful creatures as Gerhard Rohlfs (in the cool season, it is true) could use for thirty-six days with only once a scanty supply of water in all that time."

Mr. John Ross's Exploring Expedition.

(From the 'South Australian Register,' Aug. 5.)

"THE expedition set out upon its long journey westward about the 20th March [1874]. At that time it consisted of Mr. Ross, as leader, Mr. Ross's son, one other European, three Arabs, fourteen horses, and sixteen camels. *Carte blanche* having been allowed with regard to stores and equipments, it rested with the leader to decide what would be a sufficient provision for his purposes.

"Accounts received from him were written at Emma Creek—a watercourse considerably to the westward of his point of departure near the Peake. The date of the communications is April 24th, and extracts from those will best explain the state of affairs. In one letter he says:—'I have lost much time in trying for a westerly course, and stock of provisions would not be sufficient to last the whole party for the time contemplated to get over the distance to Perth. I therefore sent back A. Smith and two Arabs, with twelve camels and two horses; also sundries I don't require. I take with me my son and Kamran, ten horses, and four camels, with provisions to last at least eight months. I started from this camp in lat. 27° 58′ 18″ and long. 133° 48′ by account, keeping a more southerly course, and west as much as the dense mulga-scrub of boundless extent from east to west would permit. I tried to tap the mulga-scrub in several places, but it was of no use. I saw no direction through it which could be penetrated by the camels, and I have tried it until I got too near to Mr. Gosse's homeward track making down the Alberga. Water is exceedingly scarce and very difficult to find, and no rain has fallen of any consequence for a long time.' This certainly seems disheartening enough; but the letter proceeds as follows:—'I have every hope in the success of the expedition, and I send nothing and no one back to Beltana that I cannot do better without. The Arabs have given me every satisfaction, and I am certain they could not be replaced by a better class of men of any country. Do not believe in my defeat. So long as I have a horse or a camel, I will see my journey's end before all is over.'

"Adelaide.

"Mr. Ross telegraphs to Mr. Elder, from Beltana, to the effect that he has been obliged to return through want of water. No rain had fallen for a long time, and the horses were several times without water for four days together. A great extent of country was covered with mulga-scrub, and the immense quantity of dead underwood prevented him from using the camels for trying the country for water. Mr. Ross states his furthest distance was lat. 30° 25′, long. 131° 16′. Very few natives were seen, and on every occasion they were making towards the sea-coast, and were very wild, so that he was unable to get within speaking distance. The country traversed was high, open undulating tableland, dense mulga-scrub, and open mulga-forest, well grassed; also a great extent of open undulating plain, magnificently grassed."

Mr. John Forrest's Journey across, from Champion Bay, on the West Coast, to Peake Station, on the Telegraph Line.

LETTER to the GOVERNOR OF SOUTH AUSTRALIA.

"Peake Station, October 1st, 1874.

"I THANK His Excellency for his kind congratulation, and beg to forward a short account of our journey.

"We left Champion Bay on the 1st April, and reached Mount Hale, on the Murchison, the farthest point known, on the 4th May, and followed a fresh-water branch of the river, over well-grassed country, to its source, in lat. 25° 50′, and long. 119° E., where we turned to the south-east, in order, if possible, to strike other branches of the river; but, after going about 70 miles over grassy flats, with spinifex plains intervening, without seeing any, we turned to the north-east and crossed the watershed of the Murchison in lat. 26° 18′, and long. 120°, which was only a low rise, with a few small gullies running out of it, which flow into grassy flats, and finally find their way into the main river. We still continued on north-east, intending to do so until we reached the tropics, but entered a most miserable undulating spinifex desert, which lasted, without any interruption worth mentioning, for 600 miles.

"In lat. 25°, long. 122°, we found a most splendid spring, an oasis in the desert, and were obliged to halt for three weeks for want of water ahead; but eventually were enabled to move on slowly and by long marches, our horses often suffering from want of water, and travelling on very scanty and precarious supplies, reached a small pool in a gully in the spinifex, in lat. 26° 2', and long. 125° 27'. Here we were obliged to halt for three weeks, and made five different attempts to get ahead, and travelled over 700 miles. At last, by risking a good deal and abandoning everything we did not absolutely require, we reached some hilly granite country in lat. 25° 55', long. 126° 30', and found sufficient water in rock water-holes to last two days, and were placed in perfect safety by finding a spring in the Barrow Range, close to Mr. Giles's track, which, however, he was not fortunate enough to find.

"On the 17th August we reached the Cavanagh Ranges of Mr. Gosse, and found a camp of Mr. Giles's, at a fine spring, in lat. 26° 11', long. 128°, where we had been camped for a long time. From this point we followed along nearly Mr. Gosse's route to the Tomkinson Range, got into very serious difficulty by the water on his track being dried up, and only saved ourselves and horses by finding a beautiful spring to the north of his route, where we rested four days to recruit our weary horses.

"We continued on through the Tomkinson and Mann ranges, and on to the Musgrave ranges, and found water in several places on Mr. Gosse's track. After this we struck the Alberga, and traced it down, getting water by digging, and going often without it. We reached the telegraph line on the 27th September, and the Peake on the 30th, where we are receiving every kindness and attention. Altogether we have been very fortunate, as there has been a great drought in the interior, and scarcely any rain has fallen for a long time. We have not had any worth mentioning.

"Five horses were abandoned, and one dropped down dead after reaching the telegraph line. Want of feed was chiefly the cause of their giving in, all the grass being old and parched up.

"We have been living on damper and water for over a month, but were fortunate in having enough flour, bringing in 60 lbs. with us, besides abandoning over 200 cwt. Our horses are in the very weakest condition, and we have had to walk in turns the whole way, nearly 2000 miles. The health of the party has been very good, and they have all aided in an exemplary manner. Many natives were met, and on three occasions attacked us; but each time we were able to drive them off, and, although some were wounded, as far as we know none were killed. They are very numerous in the interior, and much game exists even in the most wretched spinifex desert.

"I trust His Excellency will excuse this hurriedly written account.

"JOHN FORREST,
"Commander of Expedition from Western Australia.

"*The Private Secretary,*
"*Government House.*"

ADDITIONAL NOTICES.

(Printed by order of Council.)

THE COUNCIL of the Royal Geographical Society have received further Circulars from the Administration of the proposed International Geographical Congress at Paris, and publish here a translation of them for the information of Fellows, in continuation of the communications printed in vol. xviii., pp. 453–62.

1.—*International Congress of the Geographical Sciences.*

EXPLANATORY CIRCULAR.

The Congress is placed under the patronage of a Committee of Honour, composed of men of eminence of foreign countries, and of France.*

A Committee of Organization, delegated by the Geographical Society of Paris, will deal more especially with the details necessitated by the meeting of the Congress.

To meet the various requirements of the work, this Committee is subdivided into five sections; viz. those of (1) Science; (2) Organization; (3) Publication; (4) Exhibition; and (5) Finance.

The Scientific Section is divided into seven groups, corresponding to the scientific division adopted by the Congress. These groups are, (1) Mathematical; (2) Hydrographical; (3) Physical; (4) Historical; (5) Economical; (6) Didactic; and (7) Voyages and Travels.

Each of these groups is specially charged with the details concerning the adoption, classification, and development of the questions which concern it.

The execution of all the measures approved by the Committee of Organization belongs to the General Commission, the central office of which is at Paris, 10, Boulevard Latour-Maubourg. All correspondence should be addressed to M. le Baron Reille, Commissaire-Général.

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* The Members for Great Britain of the Committee of Honour are: The Right Hon. the Earl of Derby, H.M. Secretary of State for Foreign Affairs; the Right Hon. Sir H. Bartle E. Frere, K.C.B., G.C.S.I., &c., and Major-General Sir H. C. Rawlinson, K.C.B., &c., President of the Royal Geographical Society.

The meeting of the Congress will take place in the spring of 1875, soon after Easter; the exact date to be announced by a subsequent circular.

The Congress will last eight days. The first day will be devoted to the ceremony of inauguration. The following six days will be employed in the discussion of the questions submitted; each morning the members, divided into groups, will meet in separate rooms; in the afternoons the meetings will be general.

During the meeting of the Congress an Exhibition will be open, consisting of objects relating to the Geographical sciences.

On the eighth day will take place the concluding meeting, and the distribution of the rewards decreed to Exhibitors.

The results of the Congress and reports of the meetings will be printed with the list of Subscribers.

The Congress will comprise Subscribers (*membres adhérents*) and Patrons (*membres donateurs*). The subscription of the former class (Subscribers) is fixed at 15 francs, for which they will be entitled to a card of admission to all the sittings, with entrance to the Exhibition, and to a copy of the publications of the Congress.

Patrons are those who contribute to the objects of the Congress a subscription of 50 francs and upwards. Their names will be published in a special list, following those of the Committee of Honour. They will enjoy all the rights of Subscribers.

All who intend to subscribe should fill up a form similar to that hereto appended, and address it to the Commissaire-Général, 10, Boulevard Latour-Maubourg, Paris.

Every Subscriber will receive a printed list of questions. Cards of admission, &c., will be delivered at Paris, at the commencement of the meeting. Subscriptions may be paid in any one of the following ways: (1) By direct payment in Paris, at 3, Rue Christine; or at the Crédit-Foncier de France (account No. 15,817); (2) by post office order, payable to M. Aubry, 3, Rue Christine; (3) by cheque on a Paris bank, payable to the order of M. Aubry, and addressed to him; or (4) by payment to a collector appointed to call personally by the agents in each large town of the bankers of the French Geographical Society. In the absence of indication on the "Form of Application," the collector will call at the address of the Subscriber.

All remittances in money should be in French coin; cheques should be for francs.

The names of those Subscribers only who have paid before the 1st March, 1875, will be printed on the list to be distributed at the opening of the Congress.

INTERNATIONAL CONGRESS OF GEOGRAPHY AND KINDRED SCIENCES TO BE HELD IN PARIS IN 1875.

The members taking part in the Congress will be divided into two classes, viz.: *Subscribers* (membres adhérents) and *Patrons* (membres donateurs).

The terms of subscription to these two classes of membership will be as follows:

To *Subscribers* (membres adhérents), 15 francs (12 shillings) which will entitle the subscriber to a ticket of admission to the Congress and to the Exhibition; as well as to a copy of the printed report of the proceedings of the Congress.

To *Patrons* (membres donateurs) 50 francs (2*l.*) and above. A special list of the members comprised in this class will be printed; they will otherwise enjoy the same privileges as the subscribers.

Intended subscribers to either class of membership are requested to fill up the particulars at foot and to return this form so filled up to the annexed address. They will receive as soon as possible a programme of the subjects to be discussed at the forthcoming Congress. The tickets of admission will be distributed in Paris prior to the opening of the Congress.

FORM OF APPLICATION FOR MEMBERSHIP.

(1) Christian name and surname in full, with particulars of membership in any scientific Society.	*I* (1) ______ ______ ______
(2) Address, naming the country.	*residing* (2) ______ ______
(3) State whether as Subscriber or Patron. (4) State which of the undermentioned mode of payment you elect. (5) 15 francs or 50 fr. or above.	*desire my name to be inscribed as* (3) ______ *to the International Congress of* 1875, *and I further agree to pay, according to mode of payment No.* (4) ______, *the sum of* (5) ______ *Dated in* ______
(6) Usual Signature.	(6)

Please write distinctly.

MODES OF PAYMENT.

1. By cash Payment in Paris, 3, Rue Christine, or to the credit of the Geographical Society at the Paris Crédit-Foncier (account No. 15,817);
2. By Post Office Order in favour of M. Aubry, 3, Rue Christine, to be forwarded to him by post;
3. By Draft on a Paris Banker, favouring the said M. Aubry, forwarded to him by post as above;
4. The Correspondents of the Banker of the French Geographical Society will collect at home if the Subscriber does not agree to any other mode of payment.

The above Subscriptions to be payable in francs.

REGULATIONS OF THE CONGRESS.

1. The International Congress of Geographical Science will be opened at Paris on Wednesday, * , 1875, and will last not longer than ten days.

2. The Congress is to be composed of donors and subscribers. "Donors" are contributors of 50 francs (2*l.* 1*s.* 8*d.*) or more; and their names will be published in a special list annexed to the published account of the Proceedings of the Congress. "Subscribers" pay 15 francs (12*s.* 6*d.*).

3. Each member of the Congress will receive a card of admission, and will be entitled to a copy of the Proceedings, which will be published under the superintendence of the Committee of the Paris Geographical Society.

4. Cards of admission will be strictly personal, and non-transferable;

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* The exact date not yet fixed.

if transferred they will be at once forfeited, regardless of any inconvenient result to the real holder or the bearer.

5. The Congressional Committee will be composed—1st. of the President of the Paris Geographical Society, who will be President of the Congress; 2nd. of Vice-Presidents (foreigners); 3rd. of a Congressional Commissary-General; 4th. of four general Secretaries; and 5th. of the General Secretary of the Paris Geographical Society.

6. A Central Committee will be formed of the above-mentioned officials, the President, and three members of the Central Commission of the Paris Geographical Society, and a delegate of each of the nations represented at the Congress.

7. The Congress will be divided into seven scientific Sections, in accordance with the order fixed by the Questions; both French and Foreign members should communicate beforehand to the Commissary-General as to the Section to which they respectively wish to belong.

8. The Central Committee will meet directly before the opening of the Congress to nominate the Vice-Presidents and Secretaries of Sections, who will officially remain as such during the Congress. The President will publish their names at the opening of the Congress.

9. Each Section will elect, day by day, a President for the morrow's meeting.

10. All decisions in Sections are to be decided by the majority present, and the ultimate resolutions notified to the Central Committee after each Sectional Meeting.

11. The Central Committee will, every day, appoint for the morrow the time of meeting for the Sections, and publish their intended proceedings.

12. A general meeting will be held every afternoon, the proceedings of which will be regulated by the Central Committee. One of the General Secretaries will read the account of the preceding meeting; and Sectional Presidents will then communicate in writing an abstract of the resolutions proposed in the morning's Sectional Meetings. The remainder of the general meeting will be devoted to the discussion of these propositions.

13. No one is to make a speech without the President's authority. Any language may be used.

14. Political or religious discussion is formally prohibited.

15. Other questions may be proposed besides those in the list of subjects published. They must be submitted, at a public meeting, to the Central Committee, who will consign them to the proper Sections.

16. The Congress, in addition, comprises a Geographical Exhibition, which will include all objects, instruments, collections, and documents relating to Geography and the allied sciences.

17. Prizes will be adjudged to such exhibitors as an International Jury named by the Congress shall deem most worthy.

18. Places will be reserved in the hall of meeting for such representatives of the French and foreign press as shall apply for the same to the Commissary-General.

19. The Commissary-General will endeavour to render the stay of members of the Congress at Paris as comfortable and economical as possible.

20. Arrangements will be made that the card for a member of the Congress may facilitate access to the great scientific bodies.

21. After the Congress, the Commissary-General will remain provisionally charged with the execution of the decisions arrived at.

22. Every contingency not anticipated by these regulations will be submitted to the Central Committee, who will decide upon it.

(Signed) Baron de la Roncière le Noury,
Vice-Admiral, President of the Geographical Society.

2. *Address to the Geographical Section of the British Association. Belfast, August* 19*th*, 1874. By Major Wilson, R.E., F.R.S., F.R.G.S. Director of the Topographical Department, Horse Guards, War Office, President of the Section.

[Abridgment.]

It has, I believe, been usual in the addresses to this Section to select some special subject for remark; and I will therefore, if you will allow me, before alluding to the geographical achievements of the year, draw your attention to the influence which the physical features of the earth's crust have on the course of military operations, to the consequent importance of the study of Physical Geography to all those who have to plan or take part in a campaign, and to the contributions to geographical science that are due, directly or indirectly, to war and the necessity of preparing for war. I do this the more readily from a feeling that sufficient importance is not attached to the study of geography as a branch of military science, and that of recent years officers in our foreign possessions and colonies have not received that encouragement which they might have expected to engage in geographical research, as well as from a hope that new life may be given to that spirit of enterprise and love of adventure in strange lands and amongst strange people which have so long distinguished the officers of both services.

To show how varied are the conditions under which war has to be carried on, and how much its successful issue may depend on a previous careful study of the physical character of the country in which it is waged, it is only necessary to remind you of the recent operations on the Gold Coast, brought to a successful issue in an unhealthy climate and in the heart of a dense tropical forest, where an impenetrable undergrowth, pestilential swamps, and deep rivers obstructed the march of the troops; of the Abyssinian Expedition landing on the heated shores of the Red Sea, and thence, after climbing to the lofty highlands of Abyssinia, working its way over stupendous ravines to the all but inaccessible rock crowned by the fortress of Magdala; of the march of the Russian columns across the steppes and deserts of Central Asia to the Khivan oasis—one month wearily plodding through deep snow, the next sinking down in the burning sand, and saved from the most terrible of disasters by the timely discovery of a well; and, lastly, of the great struggle nearer home, the last echoes of which have hardly yet passed away, when the wave of German conquest, rolling over the Vosges and the Moselle, swept over the fairest provinces of France.

The influence of the earth's crust on war may be regarded as twofold: first, that which it exerts on the general conduct of a campaign; and second, that which it exerts on the disposition and movement of troops on the field of battle. Military Geography treats of the one, Military Topography of the other; and it is well to keep this broad distinction in view, for, as with Strategy and Tactics, they stand in such close relation to each other that it is not always easy to say where Geography ends and Topography begins. Of special importance in the first case are great inequalities or obstacles that confine or obstruct the movement of large bodies of troops, and those features which retard or accelerate their march, whether they be mountain-ranges, ravines, or defiles with inaccessible sides, deep crevasses (such as those washed out in some steppe-countries by winter rains), extensive plains, dense forests, rich cultivation (such as that of the valley of the Po, which confines all movements to the roads), enclosed country like that of England and Ireland, great marshes (such as that of the Beresina and Pripet), or running or standing water that cannot be crossed without a bridge or boats. Of no less importance are those features which do not allow of the employment of large masses of troops or of special arms, such as Cavalry and Artillery, as well as those circumstances that render the subsistence of large armies difficult or impossible. In the second case, all inequalities of the ground, however slight, the nature of the soil and the effect which rain has upon it, the extent and character of the vegetation and cultivation, and all buildings, whether isolated or collected into towns and villages, are of more or less importance.

The climate of the theatre of war must always have an important influence on military operations, and should be the subject of careful study. Our own experience in the Crimea shows how much suffering may be caused by want of forethought in this respect. General Verevkin's remarkable march of more than a thousand miles, from Orenburg to Khiva, with the thermometer ranging from −24° to 100°, without the loss of a man, shows what may be accomplished with due preparation. Nor should the geological structure of a country be overlooked in its influence on the varied forms which the earth's crust assumes, on the presence or otherwise of water, on the supply of metal for repairing roads, and (if we may trust somewhat similar appearances on the Gold Coast, at Hong Kong, and in the Seychelles) on the healthiness or unhealthiness of the climate.

In any campaign undertaken by England, the sea must always play an important part as the great base of operations and main line of communication with the mother country. Special consideration must be given to the facilities which the coast-line of the theatre of war offers for effecting a landing; to the anchorages, shoals, roads, inlets, harbours, and depth of water along the coast; to the influence of the winds, tides, and currents on the entrance to harbours; to the nature of the mouths of rivers; and to the time, force, and duration of periodical storms, and their effect on navigation.

A general knowledge of the geography and topography of a country is, however, in itself insufficient for military purposes; it is necessary, in addition, to know the present state of roads and bridges, the depth and width of streams, the state of the soil and of its cultivation, &c., and especially the best means of turning the ground to account for the object in view. This information is obtained by what are called Military Reconnaissances.

It is scarcely necessary to remind you that though mountain-ranges and rivers materially affect the operations of war, they are by no means insurmountable obstacles. The Alps have been repeatedly crossed since the days of Hannibal; Wellington crossed the Pyrenees in spite of the opposition of Soult, Diebitsch the Balkan though defended by the Turks; and Pollock forced his way through the dreaded Kyber; whilst there is hardly a river in the length and breadth of Europe that has not been crossed even when the passage has been ably disputed. Soult escaping from Wellington over the Sierra de Catalina by a smuggler's path, Ochterlony penetrating into the heart of the Goorkha country by a wild mountain track, the rear divisions of Napoleon's army at Leipsic sacrificed from a neglect to reconnoitre the Elster, show how close the examination of a country should be. This is, however, hardly the place, nor would there be time, to discuss the minuter details of military geography and topography; they will be found in the works especially devoted to the subject.

Queen Elizabeth's minister was right when he said that "knowledge is power;" and a knowledge of the physical features of a country, combined with a just appreciation of their influence on military operations, is a very great power in war. A commander entering upon a campaign without such knowledge may be likened to a man groping in the dark; with it he may act with a boldness and decision that will often ensure success. It was this class of knowledge, possessed in the highest degree by all great commanders, that enabled Jomini to foretell the collision of the French and Prussian armies at Jena in 1807, and in later years enabled a Prussian officer when told that MacMahon had marched northwards from Chalons, to point unerringly to Sedan as the place where the decisive battle would be fought. Chief Justice Daly, in his address to the American Geographical Society, draws attention to the Franco-German War, as "a war fought as much by maps as by weapons," and attributes the result to "skilful military movements, performed by an army thoroughly acquainted with all the geographical features of the country over which it was moved;" and, he adds, "It teaches us that if the fate of a nation may depend upon a battle, a battle may depend on a knowledge of geography."

As, then, all military operations must be based on a knowledge of the country in which they are to be carried on, it should never be forgotten that every country contiguous to our own (and the ocean brings us into contact with almost every country in the world) may be possibly a theatre of war, and that it is equally the duty and policy of a good government to obtain all possible information respecting it. More especially is this the case with regard to the little known districts, inhabited by uncivilised or but partially civilised races, that lie beyond the frontiers of many of our foreign possessions and colonies. Is it with much satisfaction that we can turn to the efforts made by this country to acquire that geographical knowledge which may be of so much importance in time of need? Though we had for years had military establishments on the Gold Coast, and though we had, more than once, been engaged in hostilities with the Ashantees, and might reasonably have expected to be so again, no attempt appears to have been made to obtain information about the country north of the Prah, or even of the so-called protected territories. The result was that, when the recent expedition was organised, the Government had to depend chiefly on the works of Bowdich, Dupuis, and Hutton (written somo fifty years ago), and on a rough itinerary of the route afterwards followed by the troops, for their information relating to the country and its inhabitants. Nor is the Gold Coast any exceptional case: with settlements at Singapore and Penang, we know absolutely nothing of the interior of the Malay peninsula, and not much of the adjacent islands. How little have the garrisons of Aden and Hong Kong contributed to our knowledge of Arabia and China! What advantage has been taken of the presence of the officers who have been in Persia during the last ten years, to increase our knowledge of that country—knowledge which would be very useful at present in the unsettled state of the boundary questions on the northern and north-eastern frontiers? How little has been added to our knowledge of Afghanistan since the war in 1842! and what part did India take in Trans-Himalayan exploration before Messrs. Shaw and Hayward led the way to Yarkand and Kashgar?

It was with feelings of no slight satisfaction that many of us heard last year that the policy of isolation and seclusion which India appeared to have adopted, as the last soldier of Pollock's relieving force recrossed the Indus, was at last to be broken, and that an expedition, well found in every respect, was to be sent to Kashgar. It seemed an awakening from the long slumber of the last thirty years, during which we were content to stay at home in inglorious ease, resting under the shadow of the great mountain-ranges of Northern India, whilst we sent out Mirzas and Pundits to gather the rich store of laurels that hung almost within our grasp. Far be it from me to depreciate the valuable services of those gentlemen—services frequently performed at great personal risk and discomfort; but who can compare the results they obtained with those that would have been brought back by English officers, or by travellers such as Mr. Shaw, Mr. Ney Elias, and others?

If it be true (and few will be disposed to doubt it) that Arctic exploration is one of the best schools for officers of the navy, it is equally true that exploration on shore is one of the best schools for officers of the army. The officer who has had for weeks or months to depend on his own resources, organising his own commissariat and transport, fighting his way amidst hardship and discomfort, against all difficulties, will be found to possess many of the most valuable qualifications for active service in the field; and not the least of these will be that eye for ground, or ready appreciation of relative height and distance, which often comes like a second sense to the explorer.

It has been said that if officers travelled in countries where Government could no longer protect them, they might be killed by the natives, and that then, if the murderers were not punished, England would suffer loss of prestige; but is this the case? Did any loss of prestige follow the murder of Conolly and Stoddart in Bokhara or of Hayward in the mountains of Gilgit? It is hard, too, to believe that the danger of loss of life has not been somewhat exaggerated, when we find missionaries living for several years in comparative security at Coomassie; Maltzan, Halevy, and others, exploring Southern Arabia; Ney Elias crossing China at a time when political circumstances made travelling more than usually unsafe; Prjewalsky, with six Kuzaks, wandering about China for nearly three years, and spending several months on the northern borders of Thibet; Shaw and Hayward finding their way independently to Kashgar; and, finally, the Kashgar mission hospitably received not only by the Amir of Kashgar, but by the Kirghiz of the Pamir and the Mir of Wakhan. As a matter of fact, the number of travellers who lose their lives at the hands of the natives of the countries in which they are travelling is quite insignificant when compared with the number of those who return in safety. Let us, then, hope that the Kashgar mission may date the commencement of a new era during which geographical enterprise may be encouraged, or, at any rate, not discouraged, amongst the officers of the army; and that if few will now deny that a knowledge of Ashantee, of Yemen, of the northern and north-eastern frontiers of Persia, of Merv, Andkhui, Maimana, Badakhshan, and Wakhan would have been of importance in the year just passed, it may not be forgotten that a knowledge of these countries may be of still more importance in a not far-distant future.

May we not take a hint in this respect from our now near neighbours in Central Asia, the Russians? No one who has followed their movements can fail to have been struck by the intense activity of their topographical staff, an activity that can only be compared to that of England at the period when Burnes, Eldred Pottinger, Wood, Abbott, Conolly, and others, whose names are ever fresh in our memories, were penetrating into the wildest recesses of Central Asia. No sooner is Khulja occupied, than parties start out to examine the mountain-passes beyond; the capture of Samarcand is followed by an exploration of the Zaravshan Valley; Khiva has scarcely fallen before detachments are out in all directions surveying the Amu and tracing the canals that give life to the oasis; rarely does a caravan start for Manas, Urumtchi, or any place of which little is known, without an accompanying topographer. Persia has been traversed in various directions by members of the staff, and, as there has already been occasion to notice, Captain Prjewalski has found his way to the northern plateau of Thibet.

The Records of the Royal Geographical Society and of the Geographical Section of this Association show how much has been accomplished by individual officers of the English army, too often without assistance; and that if encouragement were given to them there would be numbers of men able and willing to compete with the Russians in the great field of geographical exploration.

I pass now to a consideration of the contributions of war to geographical science; and amongst these it is perhaps hardly necessary that I should mention the very obvious manner in which military operations teach us geography by directing our attention for the time being to the country in which they are being carried on, or the direct geographical results that have followed many campaigns from the days of Alexander to our own. I have no doubt that last winter many persons whose previous knowledge of Ashantee was confined to a vague feeling that it was somewhere on the west coast of Africa, were following the course of the operations with intense interest on the maps issued by our geographical establishments: and if anyone will take the trouble to compare the maps of Asia published fifteen years ago with those of the present day, he will see at once how much the cause of geography has gained by the Russian campaigns against the Khanates. The Russians are indeed far in advance of us in all that relates to those survey operations and that geographical exploration which should always be carried on simultaneously with the advance of an expeditionary force into an unknown or but partially known country; they have long since realised the importance, almost necessity, of accurate geographical knowledge based on sound systematic survey, and having learned, in time, the lesson that opportunities once lost may never be recovered, make every effort to take advantage of those that are offered to them. In the expedition against Khiva, each column had attached to it an astronomer and small topographical staff, whose duty it was to fix the geographical positions of all camps, and map the route and adjacent country, whilst officers on detached duty were instructed to keep itineraries of their routes which might be fitted into the more accurate survey. On the fall of Khiva an examination of the Khanate was at once commenced; and it was even thought necessary to send Col. Skobelof, disguised as a Turcoman, to survey the route by which Col. Markosof should have reached the Oasis. It is much to be regretted, in the interests of geography, that some such system was not adopted during the recent operations on the Gold Coast, and that so little, comparatively speaking, has been added to our knowledge of Ashantee and the Protectorate. The conclusion of peace with King Coffee, and the effect that must have been produced on the inland tribes by the destruction of Coomassie, appear to offer facilities for the examination of a new and interesting region, which it is to be hoped will not be neglected by those who are able and willing to take part in the arduous task of African exploration; and I trust that before many years have passed we shall know much more than we do at present about the Prah, the Volta, the great trade-routes leading from the coast to Central Africa, and of the open grassy country abounding in game which is said to lie between Coomassie and the lofty mountain-range called on our maps the Mountains of Kong.

The most important military contributions to geography have undoubtedly been those great topographical surveys which are either completed or in progress in every country in Europe, except Spain, Turkey, and Greece. Frederick the Great was, I believe, the first to recognise that in planning or conducting operations on a large scale, as well as in directing many movements on the field of battle, a commander should have before him a detailed delineation of the ground of a whole or part of the theatre of war. To supply this want Frederick originated Military Topography, which, in its narrower sense, may be defined as the art of representing ground on a large scale in aid of military operations. It was found, however, that during war there was rarely sufficient time to construct maps giving the requisite information, and thus the necessity arose of collecting in peace such data as would enable maps to be prepared that should show the extent, relative position, and comparative height and steepness of mountain-ranges, as well as their connection with each other, the course of the rivers, the direction of the main lines of communication, the position and importance of towns, the extent of morasses, forests, and other obstacles to the free movement of troops, and which at the same time should distinguish by different depths of shade those places over which troops could or could not be manœuvred.

In this necessity may be seen the origin of all national topographical surveys, including our own, which was commenced as a purely military survey in 1784 by General Roy, and transferred in 1791 to the old Board of Ordnance. The gradual development of these surveys, and the various stages through which they have passed before reaching their present state of excellence, need not be noticed here; but it may be remarked that, whilst in all foreign countries the topographical maps have retained their essentially military character, the Ordnance Survey maps have for many years past been constructed with the paramount view of their general utility to all classes in the kingdom, and the military character of our topographical map on the one-inch scale has had to give way to the civil requirements of the State. We find also on the Continent that the Cadastral surveys are conducted by a civil department of the State, the topographical surveys by the War department; whilst in our own country all operations connected with the Cadastral and topographical surveys are concentrated in one department, the Ordnance Survey, which since 1870 has formed part of a purely civil department of the State, the Office of Works.

Side by side with the large establishments engaged in the production of the topographical maps, there have grown up in most countries extensive departments, sometimes employing from fifty to sixty officers, whose duty it is to supplement the maps of their own and foreign countries by the collection of all information, of whatever nature, that may be useful in time of war, to arrange and classify the information thus collected, to prepare what may be called military-geographical-statistical descriptions of all possible theatres of war whether at home or abroad, to study the science of marches, the influence of ground on the movement of troops, the best and most rapid means of concentrating and moving large bodies of troops, and to plan campaigns under varied circumstances. The brief interval that elapses between the declaration of war and the commencement of hostilities, the rapid movements of armies, and the short duration of campaigns at the present day, have shown more clearly than ever the imperative necessity of previous preparation for war; and the publication of the great surveys of most European countries has given an impetus heretofore unknown to the studies I have alluded to. In our own country the Crimean war gave birth to a small topographical and statistical department; but only four years ago its staff consisted of but three officers, and even now it is hardly as large as one of the sections of its Continental brethren.

The progress of the European surveys, and especially of our own, has been marked by many results which have indirectly influenced the advancement of geographical science. Amongst these may be mentioned the improvements in instruments made during the progress of the Triangulation, the invention of the Drummond Light, of Colby's compensation bars, &c., the connection of the English and Continental systems of triangulation, the pendulum observations at various places, the measurement of arcs of the meridian, the comparison of the standards of lengths of foreign countries, of India, Australia, and the Cape of Good Hope, with our standard yard, which has recently been completed at the Ordnance Survey Office, Southampton, &c. In the same category may be placed the improvements in the art of map-engraving, in the application of chromolithography to the production of maps, as exemplified in the Dutch process of Col. Bessier, and in the Belgian maps, and the employment of electrotyping to obtain duplicates of the original plates. By the latter process copies are taken of the engraved plates in different stages of their progress, and with different classes of information engraved on the different copies, which if mixed together would have confused them. Thus the one-inch map of England is published in outline with contours, with the hills complete but without contours, with the geology, &c. The art of photography has been largely employed in the production of maps, and its use is on the increase both in this country and on the Continent, and especially in the Government Departments in India. The method of copying maps by photography without any error in scale or any distortion that can be detected by the most rigid examination, was first proved to be practicable and was adopted in the Ordnance Survey Department in 1854 by Major-General Sir Henry James, for the purpose of facilitating the publication of the Government maps of the United Kingdom on the various scales. Since that date the necessity of rapidly producing, multiplying, enlarging, and reducing maps has tended towards the development of the various photographic processes which have been brought to a high state of perfection, such as photozincography, photolithography, heliogravure, Col. Avet's process used in Italy, papyrotype, &c. Some idea of the extent to which these processes are carried may be gathered from the fact that during the last five years photographic negatives on glass, covering an area of 10,071 square feet, were produced at the Ordnance Survey Office for map-making purposes alone, and from these negatives 21,760 square feet of silver prints were prepared and used in the various stages of the survey. An area of 959 square feet of the negatives was also used in producing 13,595 maps on various scales by the photozincographic process, which was also introduced by Major-General Sir Henry James. It was by similar processes that the Germans were enabled to provide the enormous number of copies of the various sheets of the map of France required during the war of 1870–71.

The topographical maps of European countries vary considerably in scale, the manner in which the ground is represented upon them, and the style of their execution. Proposals have at times been made for the adoption of a common scale, but they have not hitherto met with much success; still, however, Sweden, Norway, Denmark, Prussia, Saxony, Switzerland, Italy, and Western Russia have each a map on a scale of $\frac{1}{100000}$; and it is much to be regretted that Austria, when commencing a new map of the entire monarchy, did not adopt this scale instead of that of $\frac{1}{75000}$. On the flat surface of a sheet of paper all inequalities of the ground must be represented conventionally, either by hachures, by contours, or by a combination of both: each system has its advocates, and the maps of foreign countries present examples of all; but it may be remarked that the use of contours is becoming much more general than it was a few years ago. Any comparison of the maps of the various countries would necessarily occupy much time, so I will only add that, as specimens of engraving, the sheets of our one-inch map are unrivalled, and that no foreign maps can compare for accuracy of detail and beauty of execution with the sheets of our six-inch survey. Our great national survey is the most mathematically accurate in Europe; and it speaks much for the ability of the officers who have brought it to its present state of perfection, that from the very first they recognised the necessity of extreme scientific accuracy in their work, and that they have never had to withdraw from the position they have taken up with regard to the many questions of detail that have arisen from time to time.

Before concluding this portion of my address, I would draw your attention to the appliances used in the minor schools in this country for teaching geography, as they would seem to need some improvement. The subject is perhaps hardly one that comes within the province of the Royal Geographical Society, which has done so much to encourage the study of geography in our public schools; but it might well be taken up by one of the numerous Committees of the School Boards of our large towns. The appliances to which I allude are models of relief-maps, wall-maps, atlases, and globes.

The use of models as a means of conveying geographical instruction has been too much neglected in our schools; if anyone considers the difficulty a pupil has in understanding the drawing of a steam-engine, and the ease with which he grasps the meaning of the working-model, and how from studying the model and comparing it with the drawing, he gradually learns to comprehend the latter, he will see that a model of ground may be used in a similar manner to teach the reading of a map of the same area. A teacher would probably find the same difficulty in enabling a pupil who had lived all his life in a level country, such as the great plains of Russia, to form from a map a mental picture of a great mountain-range, as in teaching one who had never seen a steam-engine to realise what it was, and its mode of action, from a simple drawing; the model in each case would form a connecting link.

Relief-maps of large areas on a small scale have their uses, but they are unsuitable for educational purposes, on account of the manner in which heights must be exaggerated to make them appear at all; this objection, however, does not apply to models of limited areas on a sufficient scale, which always give a truthful and effective representation of the ground. The difficulties attending the construction of accurate models, and their consequent cost, have proved serious obstacles to their common use in our schools; but models are readily built up from contoured maps, and the means of forming in this manner an instructive series of models of our own country, with ease, rapidity, and at slight expense, are quickly accumulating as the six-inch contoured sheets of the Ordnance Survey are published. Instruction in geography should begin at home; and I would suggest that as the six-inch survey progresses every good school throughout the country should be provided with a model and map of the district in which it is situated. If this were done, the pupils would soon learn to read the model; and having once succeeded in doing this, it would not be long before they were able to understand the conventional manner in which topographical features are represented on a plain surface, and acquire the power of reading, not only the map of their own neighbourhood, but any map which was placed before them. With these models topographical studies, which might be the same for all schools, should be supplied, such as a representation of a coast region, a mountain-lake with surrounding hills, a volcano, or an Alpine district with glaciers; and it would add much to their value if they were accompanied by bird's-eye views and landscape sketches. In Switzerland nearly every school has a model of the country; in Austria, France, and Germany models are largely employed for instructional purposes; they have long been in use in our military schools and colleges; and models of the environs of Plymouth, with corresponding portions of the six-inch map, are used somewhat in the manner I have suggested. The demand for models on the Continent has naturally resulted in their extensive manufacture; and some good specimens have been produced by Delagrave of Paris, Wagner of Berlin, and others; but they do not give all that is required, and are capable of much improvement.

In our wall-maps I think we have been too much inclined to pay attention to the boundaries of countries, and to neglect the general features of the ground. It is difficult to say whether the maps have followed the teachers or the teachers the maps; but I fear instruction in physical geography too often comes after that in political geography, instead of a knowledge of the latter being based on a knowledge of the physical features of the earth. My meaning may perhaps be explained by reference to a wall-map, probably well known to every one, that of Palestine, which frequently disfigures rather than ornaments the walls of our school-rooms. In this map there are usually deep shades of red, yellow, and green to distinguish the districts of Judæa, Samaria, and Galilee, and perhaps another colour for the Trans-Jordanic region, with a number of Bible names inserted on the surface, whilst the natural features are quite subordinate and sometimes not even indicated. There is, perhaps, no book that bears the impress of the country in which it was written so strongly as the Bible; but it is quite impossible for a teacher to enable his pupils to realise what that country is with the maps at present at his disposal. How little distinction is made on the maps between the great corn-growing plains of Philistia, the vine- and olive-clad hills that stand round about Jerusalem, the deep depression of the Dead Sea, and the pasture-lands of the Moabite plateau! and how little do they bring out those peculiar features which in a country the size of Yorkshire enabled the Psalmist to be familiar at the same time with the snows and alpine flora of the Lebanon and Mount Hermon, and with the intense heat and tropical vegetation of the Jordan Valley.

The first object of a wall-map should be to show the geographical features of countries, not their boundaries; and for this purpose details should be omitted, and the grander features have special attention paid to them. Many attempts have been made in this direction on the Continent, by representing the ground by contours, or by zones of altitude distinguished by tints, more or less deep, of the same or different colours, by giving prominence to rivers, coasts, &c., by reducing the importance of names by writing them small, and by inserting dotted lines instead of bright colours to mark boundaries. None of these attempts have been quite successful; but they indicate progress in the right direction, and are deserving of attention in this country.

In school atlases the same fault may be traced, physical features being too often made subordinate to political divisions; and there is also in many cases a tendency to overcrowd the maps with a multitude of names which only serve to confuse the pupil, and divert his attention from the main points.

The use of globes in our schools should be encouraged as much as possible, as there are many physical phenomena which cannot well be explained without them; and they offer far better means of conveying a knowledge of the relative positions of the various countries, seas, &c., than any maps. If a pupil once learns from a globe the places traversed by the principal parallels and four or eight equidistant meridians, with the most important places near their points of intersection, he will find more than half his difficulties overcome. The great expense of globes has hitherto prevented their very general use, but some experiments are at present being made with a view to lessening the cost of their construction, which it is hoped may be successful.

I cannot pass from this subject without alluding to that class of map which gives life to the large volumes of statistics which are accumulating upon us with such rapidity. On the Continent these maps are employed to an extent unknown in this country, both for purposes of reference and education, and they convey their information in a simple and effective manner. Amongst them may be noticed maps showing the administrative, historical, and statistical features of Germany, the distribution of religious professions of Russia, the industrial maps of the same country, the agricultural maps of Austro-Hungary, &c. Several interesting maps of this nature were exhibited at Vienna last year, one of which may be noticed as illustrating the statistics of the coal-trade in Germany, showing at a glance the districts supplied by each separate coal-field and by imported coal, as well as the proportion of home and foreign coal consumed in those places where there is competition.

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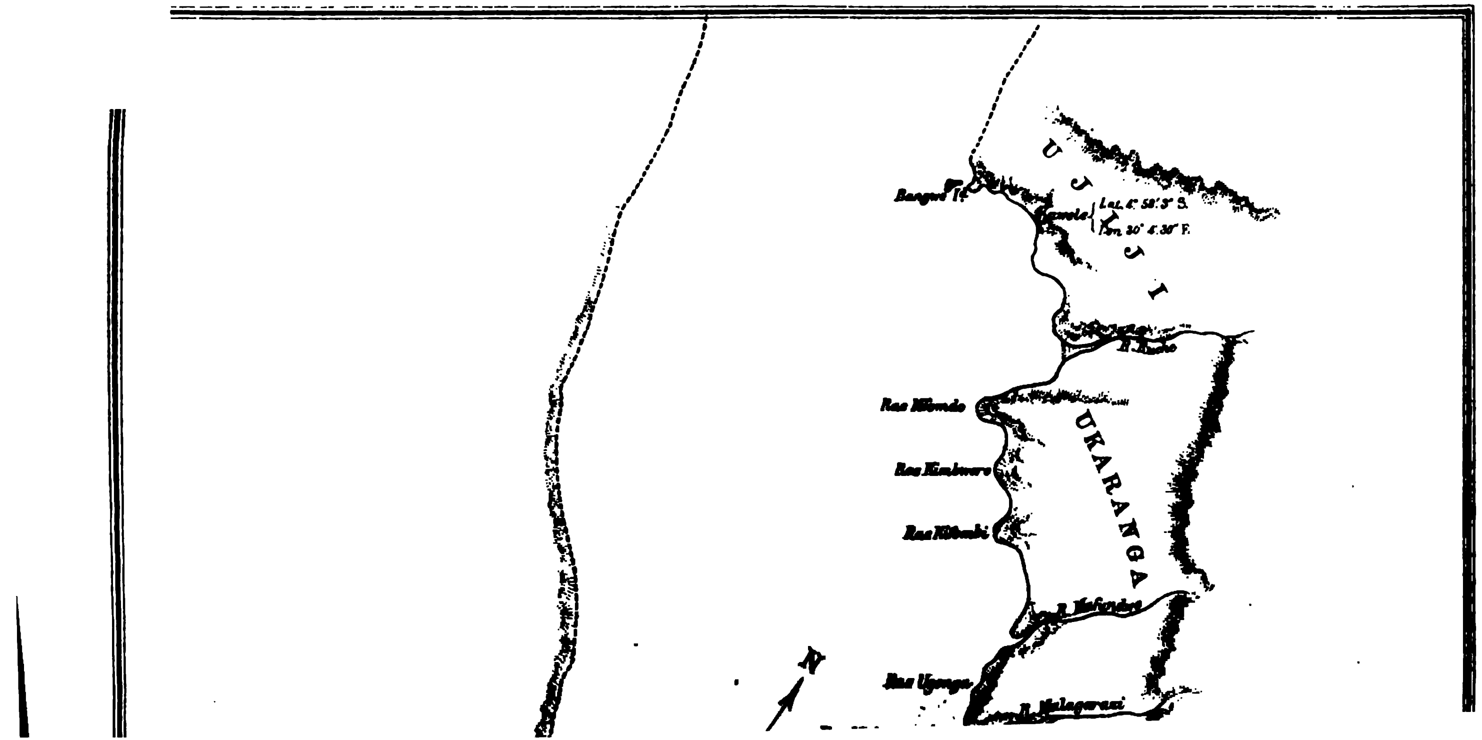
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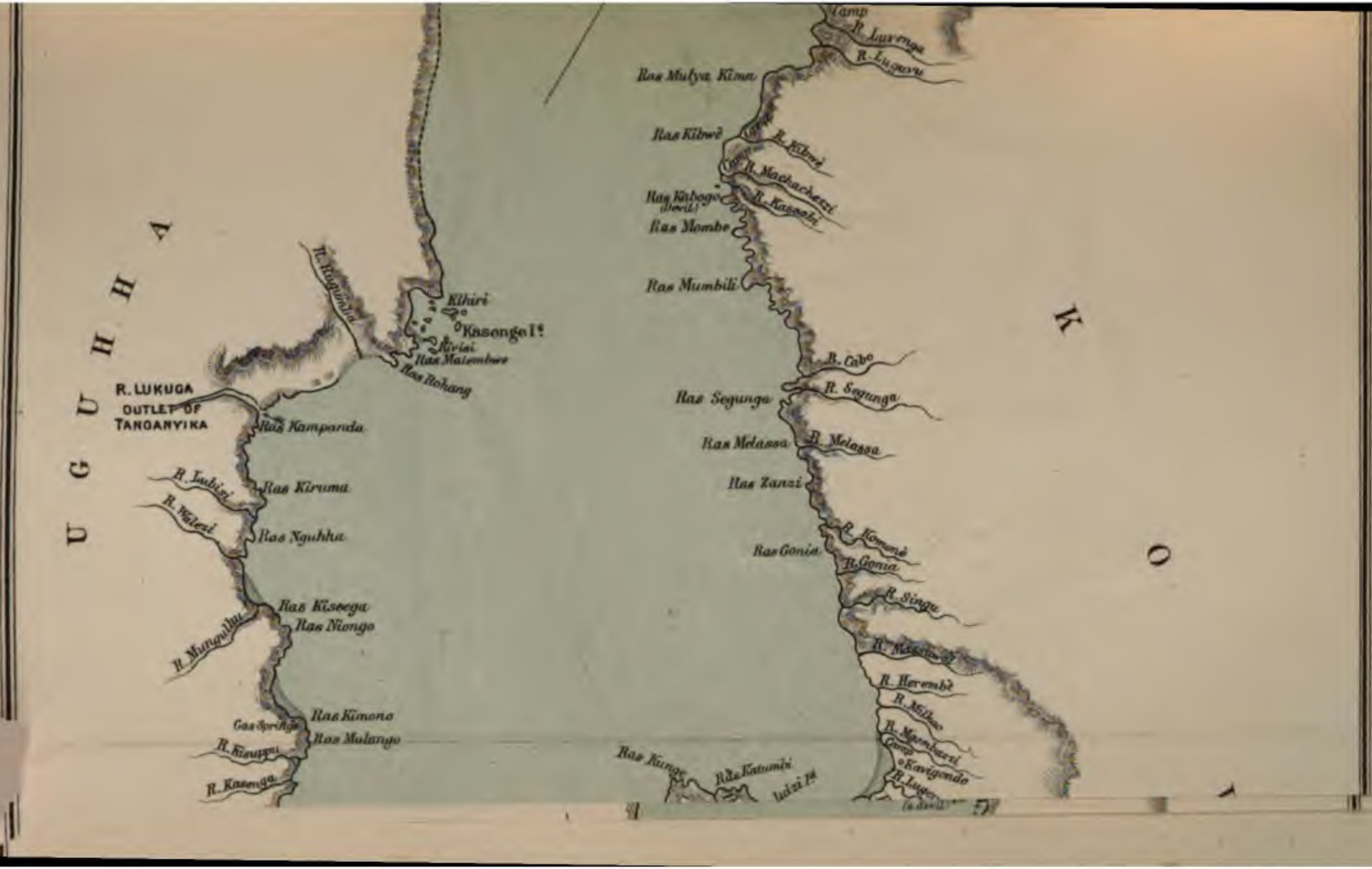
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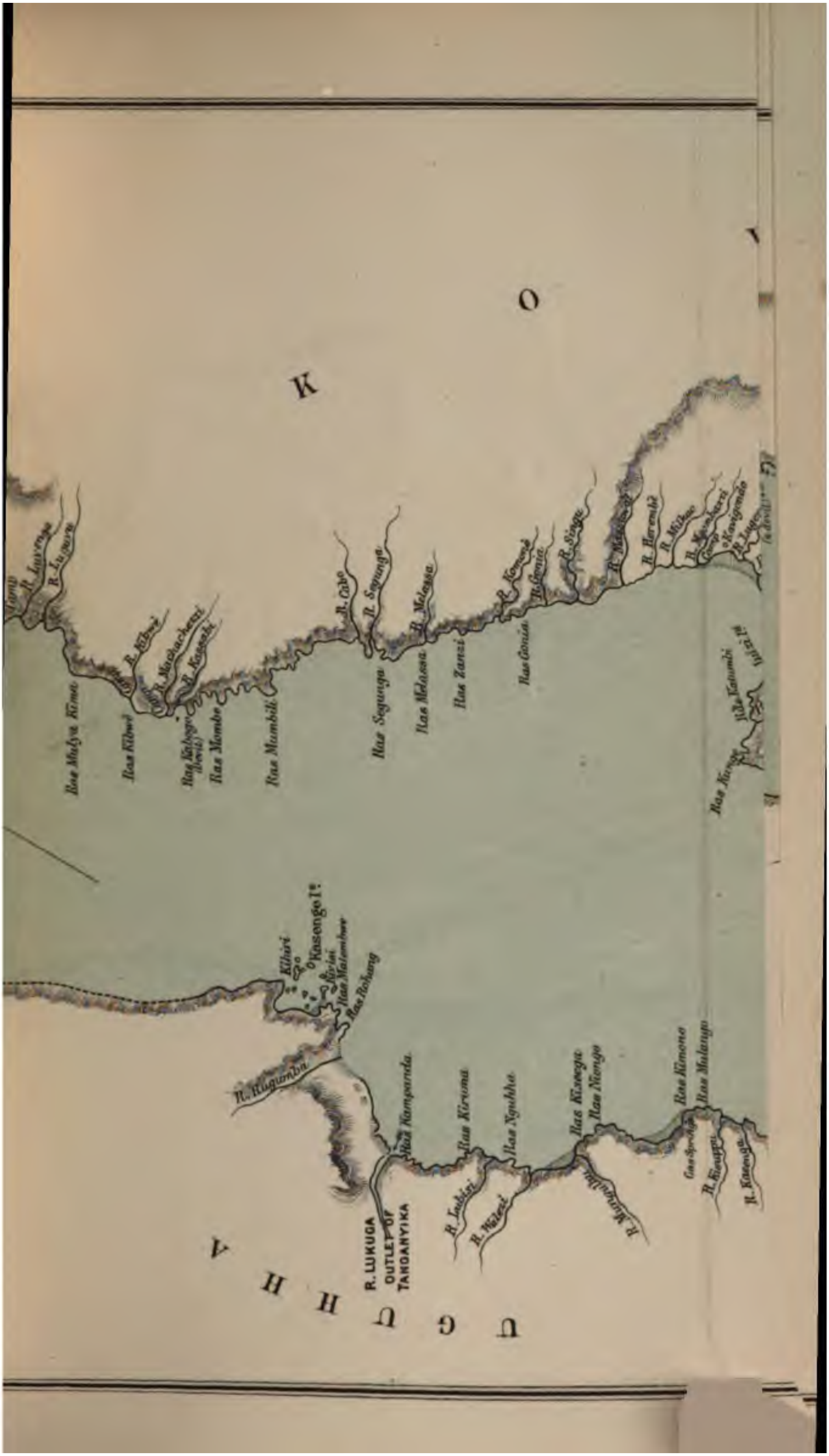
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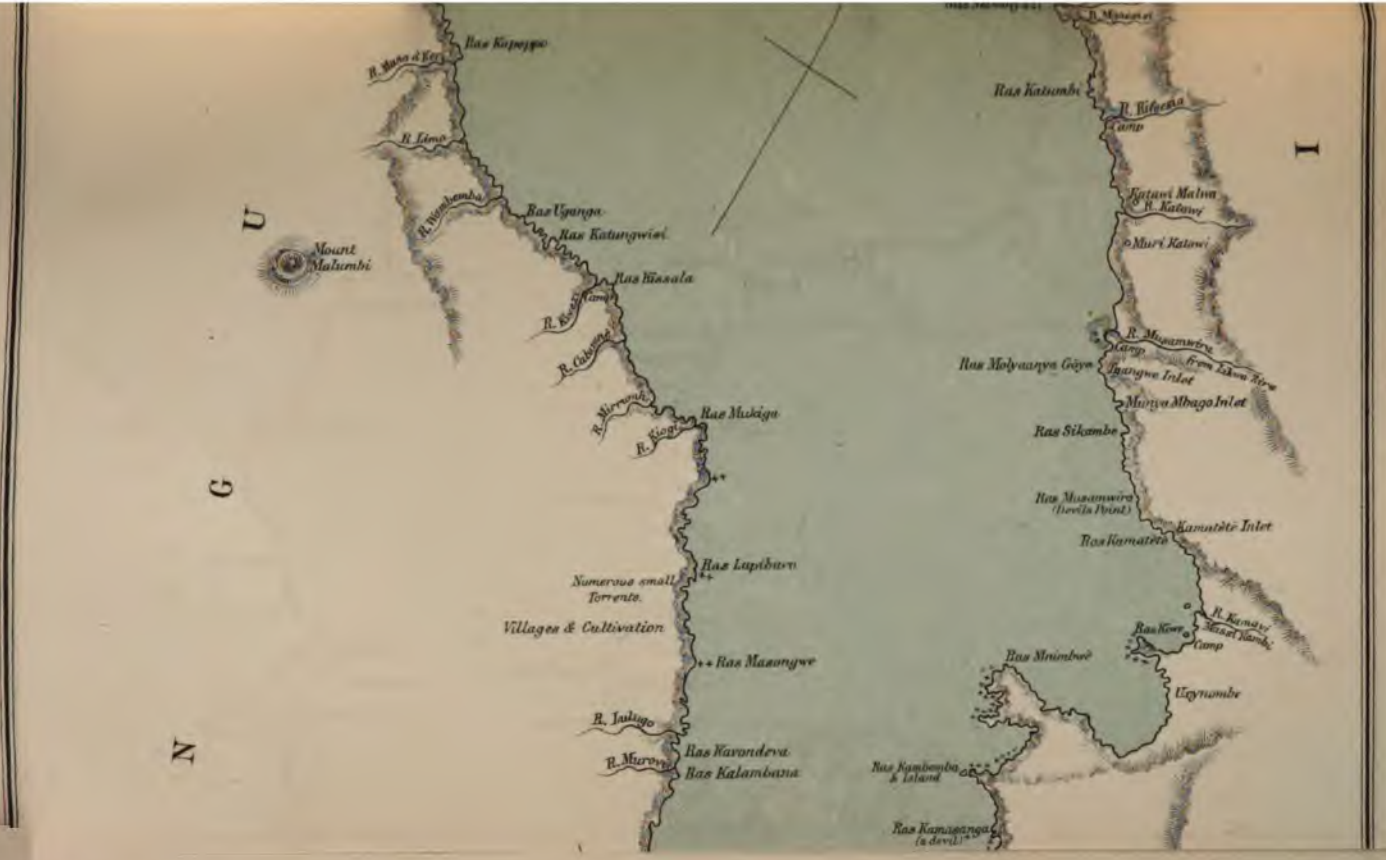
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(Devils Point)
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Ras Kambemba
& Island
Ras Kamasanga
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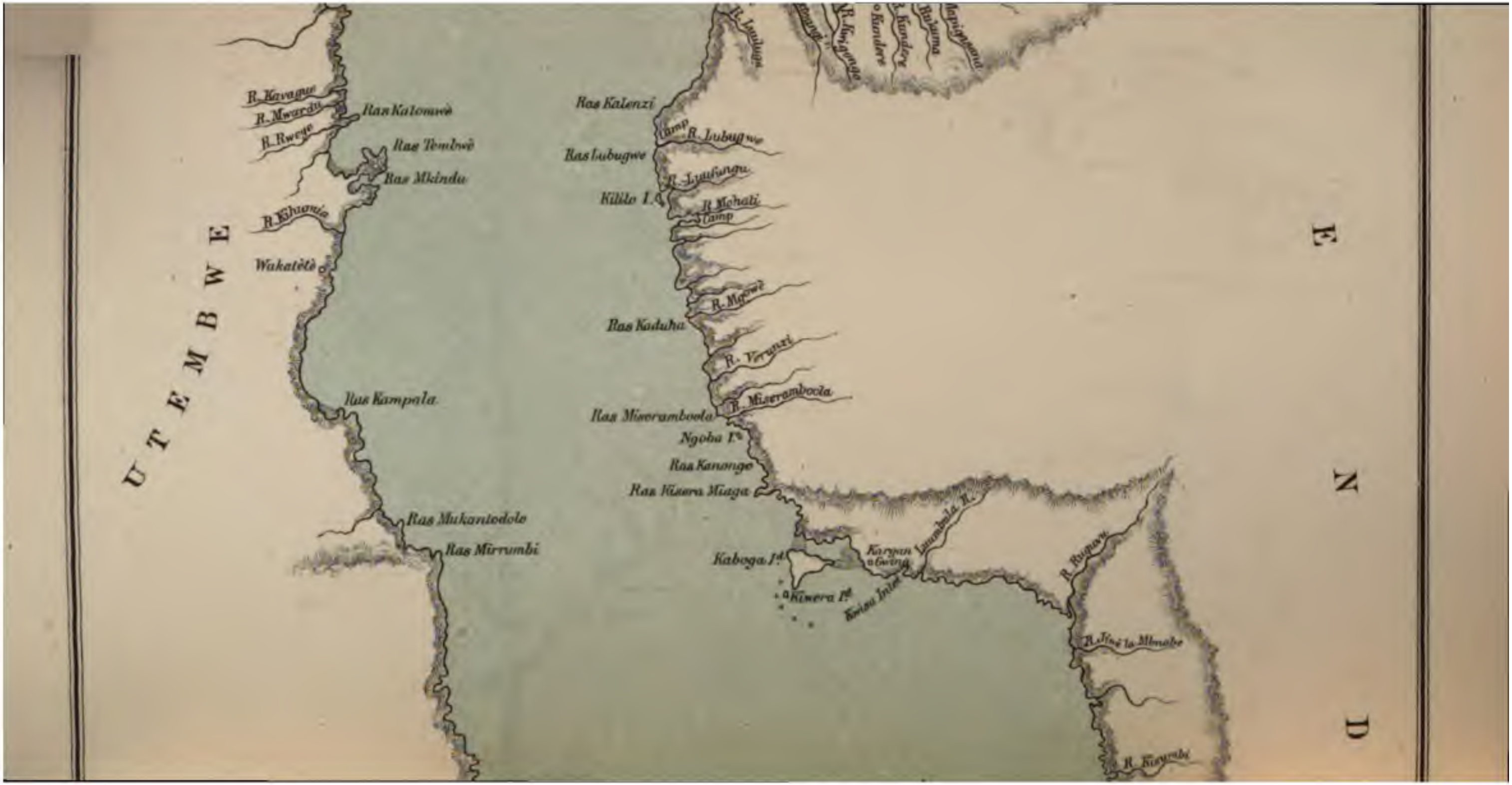
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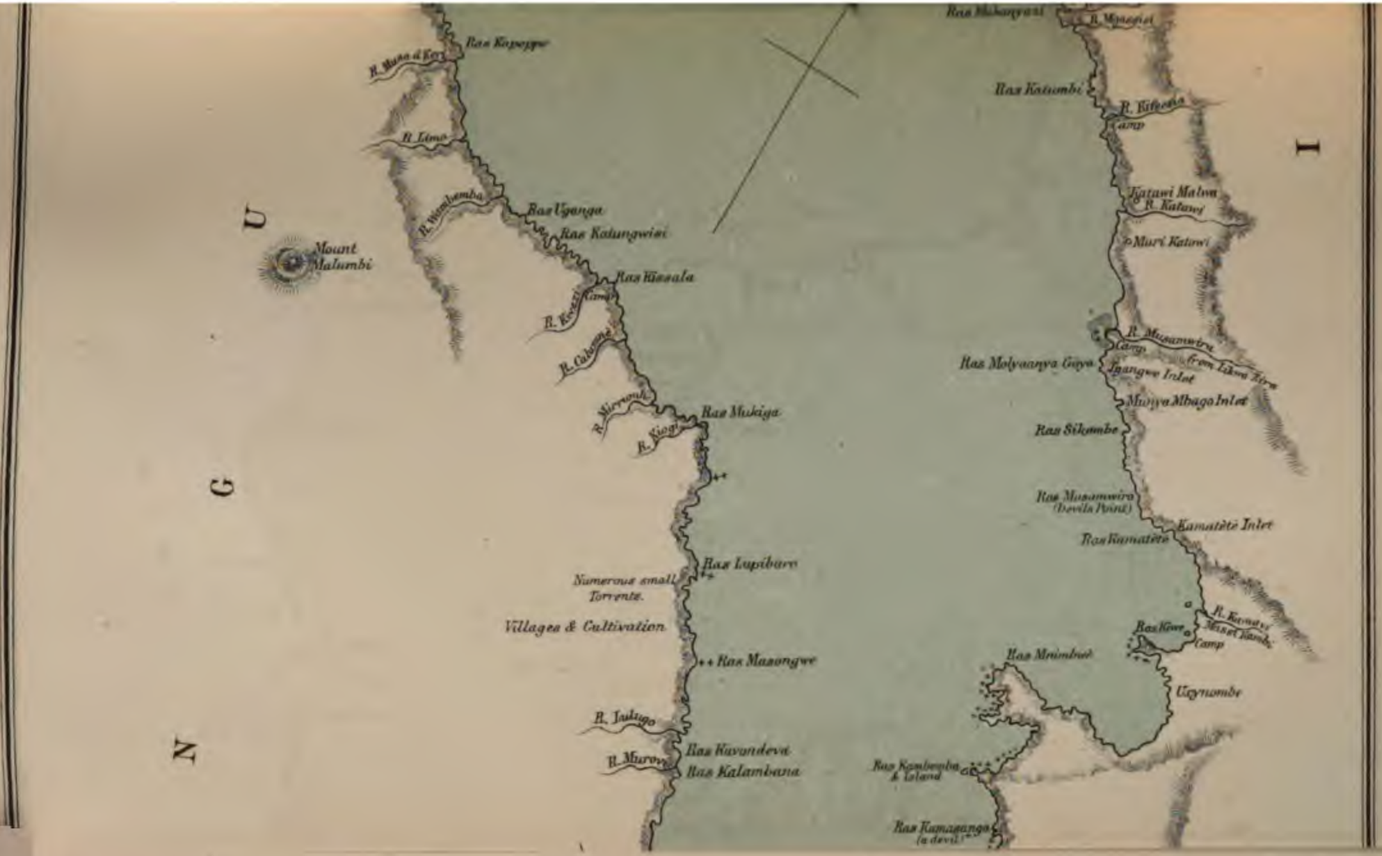
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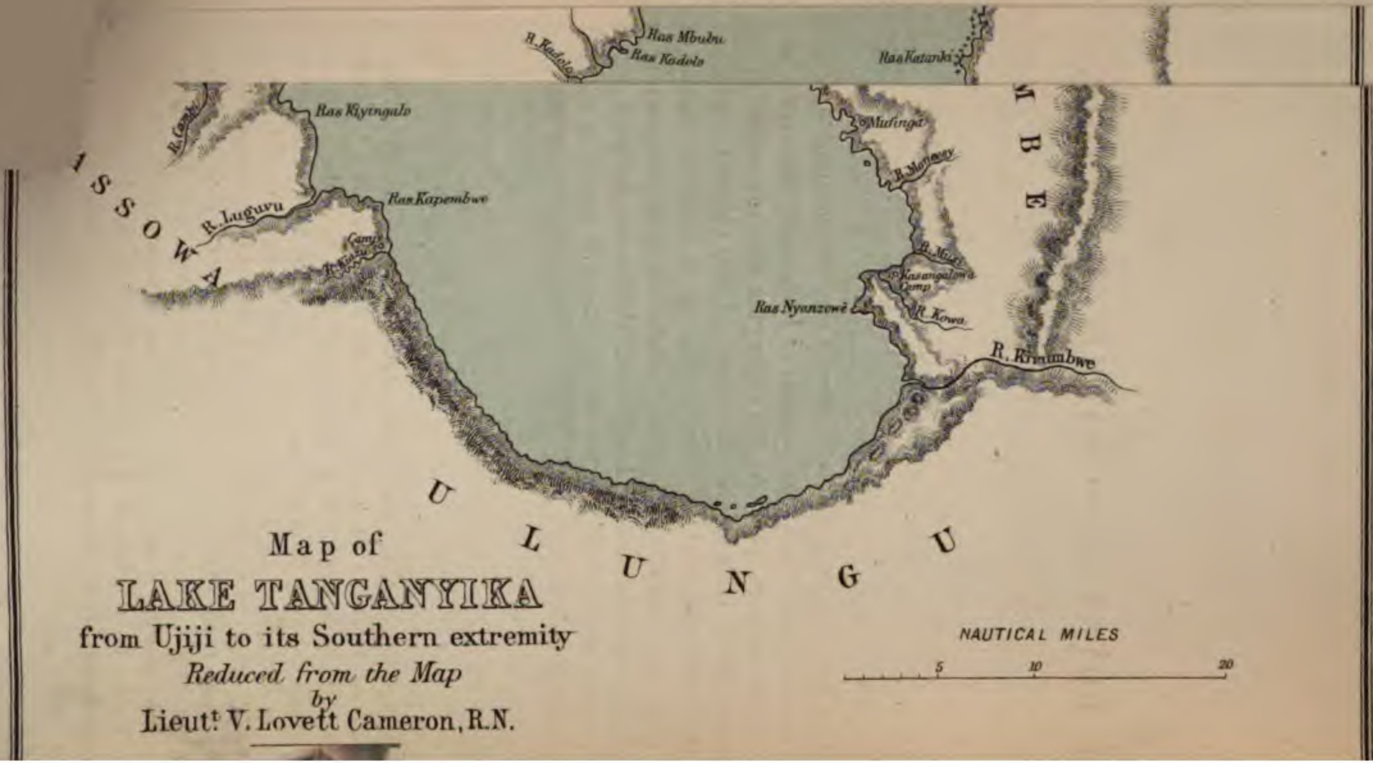

Map of
LAKE TANGANYIKA
from Ujiji to its Southern extremity
Reduced from the Map
by
Lieut^t. V. Lovett Cameron, R.N.

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[Published March 11th, 1875.]

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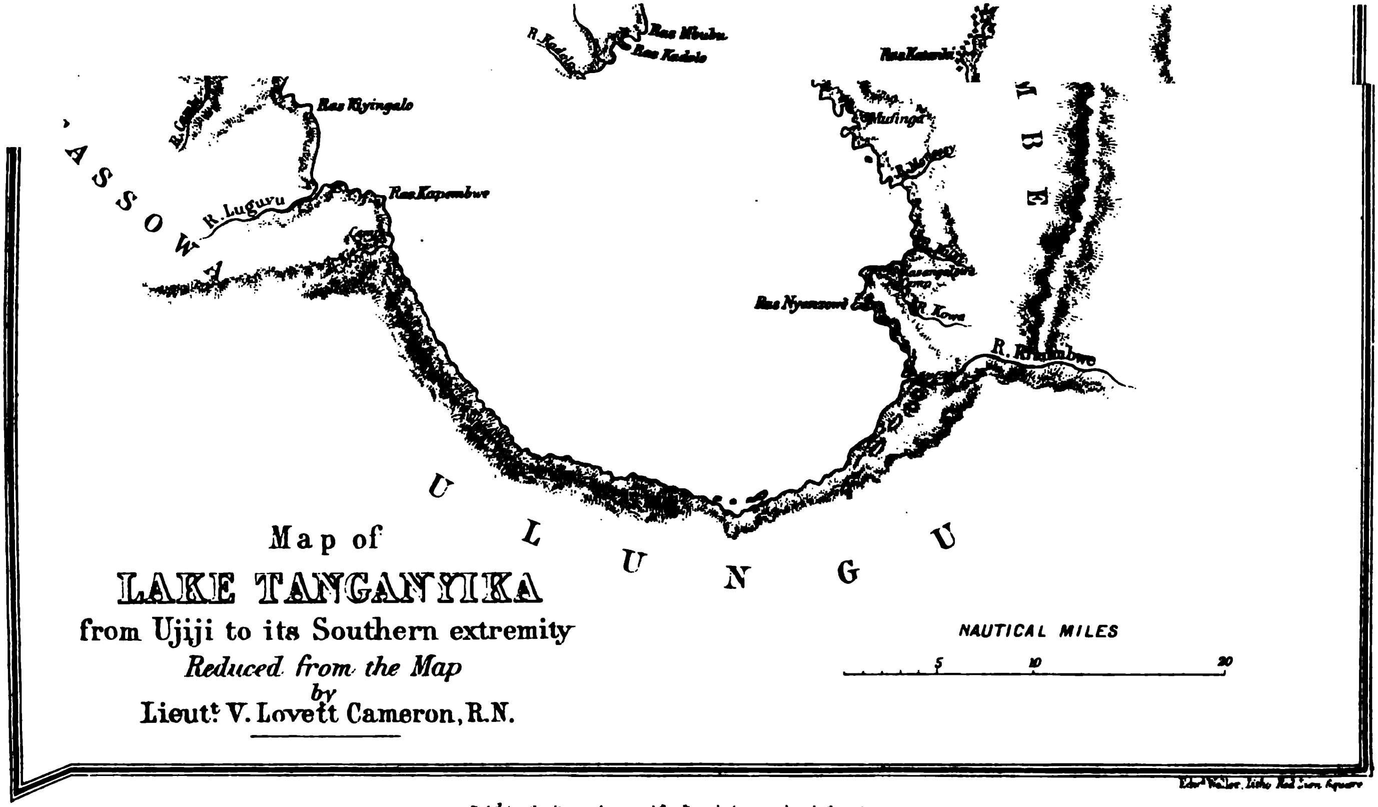
Third Meeting, 14*th December*, 1874.

Major-General Sir HENRY C. RAWLINSON, K.C.B., President, in the Chair.

Elections.—*Henry Pilkington Brandreth, Esq.; Alexander Lyons Hall, Esq.; Rev. Bedford Hartnell,* M.A.; *John Hill, Esq.,* M.A.; *John Leared, Esq.; Alfred G. Lock, Esq.; Andrew U. Mackinlay, Esq.; John Spencer Noldwritt, Esq.; Christopher Rawson, Esq.; C. Bousfield Shaw, Esq.; Robert Walker, Esq.; Hon. George Anthony Walkem; George Wedd, Esq.*

Presentations.—*Lord de Blaquière; C. J. Cassiani, Esq.; Andrew U. Mackinlay, Esq.*

Donations to the Library, 23rd November to 14th December, 1874.—South Australia: Mr. E. Giles's Explorations, 1873–74, and Report and Diary of Mr. W. C. Gosse's Central and Western Exploring Expedition, 1873 (*The Australian Government*). The Himalayan Districts of Kooloo, Lahoul, and Spiti; by Captain A. F. P. Harcourt, 1874 (*H.M. Secretary of State for India*). Reise nach Brasilien; by Maximilian, Prinz zu Wied-Nieuwied, 1821: Reise in Brasilien; by J. B. Von Spix and C. F. P. Von Martius, 1823–31: Reise in Chile, Peru, und auf dem Amazonstrome; by E. Poeppig, 1835–36 (*James Bateman, Esq.*). The Captivity of Hans Stade of Hesse; translated by A. Tootal, Notes by R. F. Burton, 1874 (*The Hakluyt Society*). The Nautical Almanac for 1878, and Tide-Tables for the British and Indian Ports for 1875 (*The Lords Commissioners of the Admiralty*). Les Missions Catholiques fran-



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Elections.—*Henry Pilkington Brandreth, Esq.; Alexander Lyons Hall, Esq.; Rev. Bedford Hartnell,* M.A.; *John Hill, Esq.,* M.A.; *John Leared, Esq.; Alfred G. Lock, Esq.; Andrew U. Mackinlay, Esq.; John Spencer Noldwritt, Esq.; Christopher Rawson, Esq.; C. Bousfield Shaw, Esq.; Robert Walker, Esq.; Hon. George Anthony Walkem; George Wedd, Esq.*

Presentations.—*Lord de Blaquière; C. J. Cassiani, Esq.; Andrew U. Mackinlay, Esq.*

Donations to the Library, 23rd November to 14th December, 1874.—South Australia: Mr. E. Giles's Explorations, 1873–74, and Report and Diary of Mr. W. C. Gosse's Central and Western Exploring Expedition, 1873 (*The Australian Government*). The Himalayan Districts of Kooloo, Lahoul, and Spiti; by Captain A. F. P. Harcourt, 1874 (*H.M. Secretary of State for India*). Reise nach Brasilien; by Maximilian, Prinz zu Wied-Nieuwied, 1821: Reise in Brasilien; by J. B. Von Spix and C. F. P. Von Martius, 1823–31: Reise in Chile, Peru, und auf dem Amazonstrome; by E. Poeppig, 1835–36 (*James Bateman, Esq.*). The Captivity of Hans Stade of Hesse; translated by A. Tootal, Notes by R. F. Burton, 1874 (*The Hakluyt Society*). The Nautical Almanac for 1878, and Tide-Tables for the British and Indian Ports for 1875 (*The Lords Commissioners of the Admiralty*). Les Missions Catholiques françaises, text and Atlas, 1874; Coup d'œil sur les voies navigables de l'Amérique du Sud, 1872; Les Indiens du Brésil, 1872; Considérations générales sur l'Amazone, 1871; Le Rio Negro du Nord et son bassin, 1872; L'Amazone brésilien, 1873; Le Solimoes, 1873; Le Rio Doce, 1873; Voyages au Chimborazo, 1874; by M. l'Abbé E. J. Durand (*Author*). Reports of explorations to ascertain the practicability of a Ship Canal between the Atlantic and Pacific Oceans by the Isthmus of Darien; by T. O. Selfridge, 1874 (*Author*). Calcoen: a Dutch Narrative of the second Voyage of Vasco da Gama to Calicut, 1504; by J. P. Berjeau, 1874 (*Author*). The Last Journals of David Livingstone, with continuation by the Rev. Horace Waller, 1874 (*J. Murray, Esq.*). Amphiorama; by F. W. C. Trafford, 1874 (*Author*); and the usual current Reports, Publications of Societies, Periodicals, &c.

DONATIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF NOVEMBER 23RD, 1874.—A Track Chart of the World, by J. W. Norie, 1824; Map of the Punjab, H. Allen, 1849; Map of Suharunpoor, H. M. Elliot, 1841 (*W. F. Thiselton Dyer, Esq., Royal Horticultural Society*). Topographical Atlas of Switzerland; parts Nos. IV., V., and VI., containing 36 Sheets. Admiralty Charts: 11 Sheets (*Capt. F. J. Evans, Hydrographer*). Temperature Chart of the United States, October, 1872, by Professor J. Henry, Secretary to the Smithsonian Institution (*Author*). Ordnance Sheet, Parish of Latheron, No. XXIX. 9 (*Sir H. James, Director*). Movable Diagram of the Seasons, showing the duration of Day and Night, &c., &c., 1874 (*J. W. Mason, Esq.*) Universal Scale for the Measurement of Maps to determine their natural scale; projected by Staff-Commander L. C. Bailey, R.N. (*Major C. W. Wilson, R.E.*)

The PRESIDENT opened the business of the evening by stating that it referred entirely to the two expeditions which were sent out two years ago to the interior of Africa, for the relief of the lamented Dr. Livingstone. Before Lieut. Grandy's account of his journey in West Africa was read, he wished to draw the attention of the Fellows to a very interesting discovery which had been made by Lieut. Cameron, the leader of the East Coast Expedition. When that officer arrived at Unyanyembe, as most of the Fellows were aware, he met Livingstone's followers returning to the coast. He then went on to Ujiji for the purpose of recovering some papers which he understood had been left there by Livingstone. Since then he had been engaged in examining Lake Tanganyika, and he had at last discovered what all geographers had been searching for for many years, namely, the outlet from that lake, which he believed to flow into the Lualaba. Physical geographers had always been convinced that there must be an outlet—otherwise it was impossible to account for the water of the lake being sweet; but hitherto all efforts to discover it had been unavailing. A letter had, however, been that morning received from Lieut. Cameron, in which he gave an account of the discovery.

The President then read the following letter from Lieut. Cameron:—

"Kawele, Ujiji,
May 9th, 1874.

"Sir,

"I have just returned from a most successful cruise round the south end of the Tanganyika, and send herewith a map of the same on the scale of 5 miles to the inch.

"I have been fortunate enough to discover the outlet of the Tanganyika, which is said to flow into the Lualaba; the current is small (1·2 knot), as might be expected from the levels. It is believed, or rather I should say I believe it, to flow into the Lualaba between the lakes Moero and Kamalondo, but the accounts I got were vague to a degree. I went 4 or 5 miles down it, when my farther progress in large boats was stopped by the floating grass and enormous rushes; however, as soon as I can get smaller canoes, I intend to return there and work it out.

"The chief at the mouth was very friendly and intelligent, and has promised all assistance in cutting a way through the grass; he seems fully alive to the importance of having a road for trade pass by him, instead of being left out in the cold, as he now is, between two routes.

"The River (the Lukuga) is about 25 miles south of the group of islands Captain Speke explored, and as none of the Arabs knew anything of it, he missed it; Dr. Livingstone, when he first came to Ujiji from Casembe's country, passed the entrance at night in a canoe, and when he went to Manyuema never went far enough south to come across it.

"I had intended to ask Sir H. Rawlinson to allow it to be called Rawlinson's Lualaba after him, but I have just received letters with the news of the Duke of Edinburgh's marriage (or the announcement that it was to happen), so I hope that the river may be called after the Princess Marie Alexandrovna, as the wedding gift of Central Africa.

"You will see by my map that the form of the south end is quite different from what has previously been laid down. I would have completed the survey of the whole, had I not on the 3rd instant discovered this river, when, thinking no useful purpose could be served by going over ground most of which had already been visited by exploring expeditions, I made my way here at once, in order to pick up the men and stores I had left, and intend to return as soon as possible. I propose buying three canoes, which will hold all I intend to take, and then where that river goes, D.V., I go too. I leave this now for the present, and will continue when I have time; but I have much to do, including finishing my map for transmission.

"*May* 15*th*.—Since I wrote the above I have abandoned the idea of proceeding down the Lukuga, as such a journey would be most expensive and require a very long time, as cutting the grass for a way would be hard work, and we should most likely require the assistance of the natives, for which one would have to pay heavily.

"I can also say almost positively that the Lualaba is the Congo. I heard the Arabs talking about Congo, but I said nothing about it, but only tried to ascertain where the Lualaba went, asking if it did not go into the 'Bahari Unyoro' (Albert Nyanza), and they said it went into Ugarowowa. I asked where; then, at last, one said he had been 55 days down it from Nyangwè, and had arrived at the sea where ships came and white men had large houses and traded in palm-oil and ivory; that the Ugarowowa was called the *Congo*, was very large in many places, as wide as the Tanganyika (a vague definition, but pointing to a breadth of 13 or 14 miles), had many islands in it, some of them large, having as many as 600 *men* living on one. I consider this to be conclusive, as far as I can judge, as it was in opposition to the drift of my questions, and a man could hardly invent such a story, the distance given being roughly 500 miles from

Nyangwè, tallying well with the distance of the mouth of the Congo. I shall be able to write again from Nyangwè *viâ* Zanzibar, but I hope to be the bearer of my own news thence. I venture to hope that you will request the Lords Commissioners of the Admiralty to direct the senior naval officer on the West Coast of Africa to order the officers commanding ships and vessels of war under his command to give me what assistance it may lie in their power to do, should they hear of my being near the coast, and also to supply passage and rations to my men to a point from whence they may be forwarded to Zanzibar; also to request the Secretary of State for Foreign Affairs to send intructions to Her Majesty's Consuls, &c., to send me their help if I should need it. The Portuguese Government, I am sure, would comply with a similar request, in case I should have to leave the Congo and strike the sea in their territories. Of course this is written without any precise knowledge of the time or place where I may, if successful, emerge. Under favourable circumstances, if the whole march has to be made on foot, I should be near the Yellala Falls in six months, as there are only 100 marches from the shores of the Tanganyika to the other side; first, 45 to Nyangwè, and, second, thence 55 to the sea, following the course of the river, and this latter portion may be done in even less, if I succeed in obtaining water-carriage. In addition to what I have asked for above, the West African mail steamers might also be instructed to render me assistance if it may be necessary.

"In the country which may be thus opened up by placing steamers on the river above the falls of Yellala, every, or almost every product of the tropical regions is to be found, together with many of those of the south of Europe. Ivory, gums, millet, maize, rice, palm-oil, cotton, ground-nuts, coffee, sugar, semsem, castor-oil, pepper, nutmegs, and indiarubber are found here. Wheat grows here at Ujiji; wild grapes also are found; and as the climate is much the same as that of the Canary Islands, no doubt the vine could be cultivated with advantage. The vast importance of opening such a region to European trade cannot be over-estimated, and so doing, would put an end to the internal slave-trade, which is, I believe, larger than that carried on by sea. I cannot believe but that a little judicious pressure would remove all the difficulties with the chiefs near the Yellala Falls, and enable the trade to be opened at once.

"I hope to leave this in two or three days, and trust to make a successful journey. The roads are said to be good and the country healthy.

"The country here is decidedly healthy, and I think I have now shaken off the Unyanyembe fever which pursued me up to here; the last severe attack of fever that I had was just after leaving here on my cruise round the lake, and was, I think, a continuation of an attack which I had had before leaving. One great thing is that in front I hope to be spared long halts, which are always bad for one, as employment does not allow the mind to prey on the body as it did during our long detention at Unyanyembe, where I was constantly fretting myself at the delay and expense.

"I now come to what is always disagreeable to me, the question of expenses. I told you that I hoped I had stores for a year, when I wrote from here, and so I had, according to all that calculation could tell me, but theft has been going on, and I have lost ten loads by it; and, owing to the supineness and stupidity of Bombay and the askari, the thieves, with one exception, remain undiscovered. My brass, which I was told was valuable here, has proved the reverse, sinking to half its value with regard to other goods, and being, I am told, utterly valueless in Manyuema, where the people obtain copper in plenty from Katanga and do not value the white brass (as brass is called in contradistinction to copper, which is called red brass) at all, and will have nothing to do with it. I lost heavily in the hire of my boat, and have had to exchange the remainder at a great discount. Ten loads which I had to leave behind on account of the desertion of porters, never arrived, nor have the men I sent for them from here, although I have heard of their having been in Unyanyembe for a long time. Under these circumstances, I have been obliged to purchase again to the amount of 920 dollars. I have lost 34 loads out of 62; 24 by theft, and 10 by desertion of pagazi. I have used 12, so that I was right in my calculations if I had not been robbed.

"The dishonesty of the Zanzibar men is something appalling. I have, however, announced my intention of flogging and discharging at once any man convicted of thieving, and I hope this may have the effect of stopping it on ahead; if it goes on, and I don't detect the offenders, I see no prospects but gloomy ones for the fate of the Expedition. Starvation will be our end; but it is no good being down-hearted about it. God, who in His great mercy has spared me hitherto, will, if it be for good, no doubt bring us safely to our journey's end.

"I have the honour to be, Sir,
"Your most obedient Servant,
"V. Lovett Cameron.
"Lieutenant, R.N.

"P.S.—There was an error in my calculation of height by mercurial barometer when last here; it should have been 2710 feet by mercurial barometers, the same as the aneroids, whilst the thermometers give 2510 or 200 feet lower.

"P.P.S.—I have drawn two bills here, one for 1173 dollars, and one for 325 dollars."

The President, in commenting on the above letter, said that from the barometrical and thermometrical observations which had been made, it had always been understood that Tanganyika was about 1000 feet above the Lualaba; but that only referred to the Lualaba at the point where Livingstone measured it, and as the river which Cameron had discovered flows apparently from the lake to the upper Lualaba, the difference of level may not be so great as 1000 feet. When Livingstone was with Stanley, at the northern end of the lake, making enquiries about the outlet from it, he heard, as he noted in his 'Journal,' that the waters found an outlet probably by the Longumba River into the Lualaba, but he stated that it could not be regarded as anything more than a theoretical discovery. This Longumba was the very name which, on his map, he applied to the river which is the real outlet, but which Lieut. Cameron calls the Lukuga. The only error was that, on his map, Livingstone made the river flow in instead of out; but he had evidently thought there was an exit at that very aperture. Several difficulties suggested themselves on reading Lieut. Cameron's account. In the first place, as far as had been hitherto known, and as far as Lieut. Grandy's information went, the Arabs do not call the river the Congo, which was the name applied near its mouth. It seemed very strange that any one at the Tanganyika should know the river as the Congo, which is a Portuguese name. In the next place, 55 days seemed a very small allowance for the route from Nyangwè to the coast. Lieut. Cameron expected to take 45 days from Ujiji to Nyangwè, and, if that calculation were correct, he would take at least double that time to reach the western shores. Again, the name Ugarowwa recalled an appellation which was often applied to the Albert Nyanza. The whole question was thus left in considerable doubt and obscurity. The balance of evidence certainly shewed that the Lualaba must be the Congo, but Cameron's description rather tended to throw doubt upon that conclusion than to confirm it.

The Rev. Horace Waller expressed his admiration at the pluck and courage which Lieut. Cameron had displayed. He had shaken himself free from a great many embarrassments, had reached Tanganyika, and had set himself a task which already smacked of something like completeness. Lake Tanganyika had not previously been coasted all round. Livingstone did his best; but in his last days he was failing, and could not settle the question of the outlet, although in his journal, and on the map which had come home, he stated his belief that there was an outlet from the lake on the western side. Lieut. Cameron seemed to have set about his work in the right way. First of all, he had gone down the East Coast, and then passed on to that portion of the West Coast which he knew the Doctor had not surveyed. As the letter stated, when Livingstone sailed along that coast it was in the night, and he was so prostrate that he was unable to take any observations or even to put questions to the natives. Still there were difficulties to be met with in Lieut. Cameron's account. The letter was written on the 15th May, when he had returned from exploring the outlet, just at the very time when the heaviest rains had prevailed. Tanganyika, after all, is but a large cistern, and must at that time have been as full as it could be. The outlet through a mountain gorge therefore ought, according to all physical probability, to have been what was called in Scotland "in spate," with a great rush of water out of it. Instead of this, Lieut. Cameron found it choked up with weeds and grasses, which he could not cut his way through. When Livingstone, in a burning state of fever, passed along that part, the Arabs anchored their canoes every night in one of the numerous bays, which in many cases extended 4 or 5 miles in amongst the mountains. So far Dr. Livingstone's account tallied with that of Lieut. Cameron, but the 1000 feet fall was a great difficulty to Livingstone. He knew, as far as he could know from native report, that a river did flow from Lake Tanganyika through the mountains, and eventually found its way into the Lualaba. It was a long time before he found his way out of the difficulty of the great difference of level; but he was at last told by the natives that the river, after leaving the lake, fell over cataracts. This would solve the difficulty connected with the altitudes. With respect to the Lukuga River, it should be remembered that unfortunately the same or nearly the same name was applied to many streams. Livingstone made one large river flow in on the lake's western shore, and that was the nearest river to the point where Cameron had found his Lukuga. Livingstone marked it the Lofuku River, and placed it to the south of the Logumba, which flowed into Tanganyika, he was as certain as he could be about anything. There was also a river Lofigumba, and the similarity of the names tended to beget some confusion. With regard to the name Ugarowwa, it should be remembered that the "R" and the "L" in all these names are interchangeable, and Chumah and Susi both stated that the Lualaba when it gets to the North is called the Ugalowwa. It might therefore, after all, be the Lualaba into which Cameron's river runs. There was still a great deal to be learned on this question, and it was a very fortunate thing that a young officer, full of zeal, in good health, and thinking nothing of hardships, was out there engaged in solving the problem.

Report of the Proceedings of the Livingstone Congo Expedition. By Lieut. W. G. Grandy, R.N., Commander of the Expedition.

The President, in introducing Lieutenant Grandy, said the Meeting would remember that, when it was supposed that Dr. Livingstone must be in great distress in Central Africa, a relief fund was instituted by some of his friends for the purpose of affording him assistance from the East Coast; while one of Livingstone's old friends, Mr. James Young, of Kelly, came forward, n the most munificent manner, offered to defray the whole expenses of an tion which should proceed up the Congo from the West Coast, and our to meet and afford relief to Livingstone, if he should return to his native country by that route. Lieutenant Grandy was sent out, and all the expenses that he had incurred had been met by Mr. Young to the amount of over 3000*l*. Lieutenant Grandy did all that a man could do under the circumstances, but he met with the greatest possible difficulties, and ultimately was obliged to give up all hope of entering the country to the south of the Congo. He then crossed over to the north side, and with better hopes of success, and was on the point of proceeding into the interior, having made his arrangements for doing so, when he received the letters recalling him. When the positive news of Livingstone's death arrived, of course the Society could not expect Mr. Young to continue to defray the expenses of the expedition for purely geographical purposes. Lieutenant Grandy had gone over a good deal of new country, and the results of his observations were of very great value. He might have had to complain of one or two Portuguese officers with whom he came in contact, but, on the other hand, he received from the Portuguese Agent at Bembe great assistance.

Lieut. GRANDY then read his Report as follows:—

THE Expedition left Liverpool on the 30th of November, 1872, and, calling at Sierra Leone to procure men, proceeded to St. Paul de Loanda, where the outfit was purchased; and finding on inquiry that Ambriz would be the best place to obtain carriers for the interior, we started for that port on the 15th of February, 1873; and, after considerable difficulty in procuring the requisite number, left on the 12th of March; and passing round the east side of the swamp proceeded in a north-easterly direction through Cola village and across the Loge River, which at the ferry is 35 yards wide and 3 fathoms deep midchannel, with a current going to the westward of 1¾ knot an hour. On the left bank for some distance above and below the ferry are large plantations of bananas and sugar-cane, the latter being used largely in making rum; the factory is on the right bank of the river, and is owned by a Portuguese named Jacinto: here the rum is manufactured, and I am told the demand is so great that it is necessary to give an order twelve months in advance. Crossing the river, we proceeded through some low swampy ground with high grass towards the village of Kingombo; and as I did not deem it prudent to remain in such a swampy locality, we passed through the town, and climbing a hill established our camp on the crest of it; here we were visited by the chief of the town, who *dashed* us with a small pig, and was apparently anxious to explain a great deal about himself and family, and their importance, but fortunately was too drunk to do so, and we were thankful to get quickly rid of him, with a promise of seeing him on the morrow. On the morning of the 13th, having passed an exceedingly unpleasant night (almost eaten by mosquitos, which drove me out of the tent several times, in spite of the heavy rain which came down nearly all night long), the capata came and said the carriers were perished with wet and cold, and anxious to proceed; and, as the weather looked promising, and I did not feel disposed to endure another night of torment, I made arrangements for a start: got away shortly after nine o'clock, and proceeded in a nearly north-easterly direction, and camped for the night at Muxixe, just outside the village. We struck camp very early on the following morning (the 14th), and after 4½ miles' march through high grass we reached a small village, with a remarkable cone-shaped hill on the left covered with trees. The water here was so bad I would not allow the men to drink it, and an hour's farther march brought us to the village of Zunga, pleasantly situated in a clump of trees; very good water can be found close to it: in 1½ hour more we arrived at the village of Wibisi, and pitched our camp close to a good stream under a large tree, which afforded an ample shade from the sun. The country is already improving in appearance (to-day we passed through some very pretty park-land with large grassy plains), and getting more elevated and ridgy; soil principally sand, with some stray boulders of granite. The village is on the rising ground on the opposite side of the stream. We found everything exorbitantly dear here, and therefore purchased only what was absolutely necessary. We are not yet far enough from the coast to excite much curiosity in the minds of the natives.

On the morning of the 15th we started at 4.10 o'clock, having a good moon to guide us, and arrived at Vakage shortly after 6, where we halted a short time; then on in an easterly direction, through high grass, and crossing three small streams, arrived at the village of Lamboo. We were all much done up from the excessive heat of the sun and the long march. We found good water here, but provisions were both scarce and dear, owing to the Portuguese having burnt the village about six months previously.

We remained here Sunday (16th) to rest the carriers; and early in the morning (7 o'clock) a heavy tornado from the north-west passed over; fortunately our tents were well pitched under trees, or they would have stood a poor chance.

Started on the 17th at 4.30 A.M., through long grass saturated with dew, which was anything but pleasant, and, descending, forded the River Kidilo, which was waist-deep. Passed by a small village, where we found some carriers, and two hours' march brought us to another stream: here we noticed a palm-tree, the first we have seen since leaving the coast. Morning fine and cool; wind easterly; barometer in valley, 29° 45′. After fording the Kala River the palm-trees became more abundant. We had a great deal of river-work to-day, besides some disagreeable swamps to cross, and were very thankful to reach Quiballa: here, owing to the carriers loitering, I was obliged to remain three hours in my wet clothes, fortunately without any ill effects. This is the first large village we have seen: it numbers about 400 souls, and is pleasantly situated on a rising ground, and well surrounded by trees. There are large gardens and extensive farms in the neighbourhood: ground-nuts, cassava, bananas, limes, sugar-cane, and guavas, chilies, &c., are produced here in abundance; the rubber-vine also grows plentifully. The huts are well built, wattle and daub, with thatched roofs, and the town is kept tolerably clean. There is a hut set apart for the accommodation of strangers. I exchanged some small presents with the chief, who is very old, and very partial to the white man's rum, if not to the white man.

I delayed here one day to rest the carriers and give those behind an opportunity of overtaking us, and started at daylight on the morning of the 19th; the carriers would not leave earlier on account of the first portion of the road being very stony and precipitous. We crossed the Quiballa River twice whilst making for the head of the valley, and that finished with the rivers for the day. We had some stiff climbing to reach the crest of the hill, on which is the village of Matooka. The deep valleys are all under cultivation. Passing through the villages of Kibella and Gungongo, and along a tolerably good road, we arrived at the village of Kanangwala, where we camped for the night. The house of the chief was built after the manner of the Portuguese, with doors and windows, and whitewashed, giving it a very neat appearance. Just after dark, the chief commanded silence in the village, and then, in a rich, clear voice, told his people and the strangers—a good many of whom were in the town—that there was a white man arrived with a large quantity of goods, and that he hoped no one would be guilty of thieving, which would give his town a bad name: to which they shouted in chorus that they would not. I *dashed* him before leaving for his honest intentions. We saw a woman spinning native cotton: here the plant grows abundantly.

On the morning of the 20th we struck the camp at 3.30, and for the first mile had a very uncomfortable walk through long wet grass; then about 2 miles to the head of a valley. Over the crest of the hill, down an incline, and breasting another hill, we saw to our left, perched in a nook, the village of Tomboko. Descending the hill in a thick fog we arrived at a breakfast-place, where native women, in anticipation of the carriers arriving, were busily preparing foo-foo and bean-soup. From this point the road was nearly level, with high grass. At 10 o'clock arrived at the village of

Kimalenso. We found provisions much cheaper here, and could obtain guavas, pumpkins, tomatos, beans, fowls, and onions.

Friday, 21*st*. Started at 4 o'clock, with a good moon to light us on the road, which was good and very tolerably level. At 5.30 we came to a nasty piece of swamp, and then, gradually ascending in an easterly direction, passed round a hill, and from the top of a neighbouring one obtained our first view of Bembe Hills: descending, we passed through a swamp, waist-deep and 100 yards across, and then on through high grass till near the Muchinga River, where we halted three-quarters of an hour. At 10 o'clock we crossed the Loofoozi River, 40 yards broad, waist-deep, with a rapid stream running at the ford. After crossing, pushed up through a piece of jungle and wood that skirts the river, waded through a small swamp, and, ascending a hill through long grass, saw at the bottom, in a clump of trees, the village of Quilumbo Cambembe, where we slept the night.

We found some of our cargoes that had been sent in advance in this town, so added the carriers to our party, and started on the morning of the 22nd, at 4.30, *en route* for Bembe. We had four streams to cross to-day, but fortunately all were bridged. Arrived at Luchinga, we halted for an hour. This village is planted in the centre of a grove, with a river of clear and beautifully cool water passing it. As the sky looked threatening I hurried the carriers on, and after an hour's march, over hill and dale, through long grass, plainly espied the whitewashed buildings and fort of Bembe 3 miles distant. At noon we crossed the Luqueia River by a bridge nearly finished; it is planked, and by far the best we have seen. We were very glad to be able to make use of it, otherwise we must have rafted across or swam the river, as it is deep and broad.

We reached the citadel of Bembe on the 22nd of March, after a breather up the hill, which is very steep, and were very kindly received by the Chefe, who housed the men comfortably in a portion of the barracks, and gave a lock-up store for our cargoes. The last carriers arrived at 3 o'clock, and shortly after the rain came down in torrents, with much thunder and lightning, which lasted till midnight. This is the season for heavy rains The finest months at Bembe are May, June, July, and part of August, when the weather is nice and cool. The latter part of August and the month of September are also considered fine: in October and November there is plenty of rain; in December, January, and February light rains; March and April are the big rains. Bembe is the most advanced post of the Portuguese, and at the same time a very important one, as commanding the roads to and from the interior. The fort is in a very bad state of repair, and there was a strong rumour that the Portuguese intended abandoning it. There are four markets held on consecutive days near Bembe; the first is called Candoo, the second Conzo, third Kangue, and the fourth Sonha.

Tuesday, 25th March.—Paid a visit to-day to the copper-mines. There seems still to be a considerable amount of ore there: formerly they had an English manager here and every requisite in machinery; but the manager died, the Company got into difficulties, and the whole plant was eventually destroyed by fire. There is a Chefe at Encoge, 3 days south of this, through whom communication is kept up with Loanda. The place produces large quantities of good quality coffee, and fine sheep may also be obtained, but the climate, from the greater quantity of rain that falls, is much more unhealthy. At Zombo, which lies about 7 days' journey from this, good cattle are obtained for cloth: it produces also coffee, india-rubber, tobacco, palm-oil, &c., and is considered a large place. Sierra Bembe, which is a remarkable mountain, and round the base of which passes the Luqueia River, is 1695 yards from the fort. I took a boiling-point on its summit, which gave a mean reading of 208° 1'; barometer, 28° 16'; thermometer at commencement, 78°; at finish 82°.

Thursday, 3rd April.—Having vainly endeavoured to procure carriers from the different villages round Bembe, who, one and all, refused to go even when the Chefe exerted his authority to assist us, saying, there was too much water and too much long grass on the road, we determined to send to the King of Congo for men, and accordingly dispatched the interpreter, one soldier, and a capata, with letters from the Chefe, and ourselves, and a good present.

Wednesday, 9th.—Paid a visit to the caves, which are in the same valley as the mines; but a mile further to the south-eastward they are very interesting, and the rocks from which they have been scooped form a strange feature amongst the surrounding soil of slate and shale, being composed entirely of limestone; the entrance to the first cave is by a low narrow passage, and having arrived at the end, you enter a circular vaulted chamber about 35 feet in diameter and 40 feet high; beyond this again is another chamber nearly 60 feet in height, and also circular; in these caves it is said the natives deposited the copper ore they collected at the mines, before the Portuguese took possession. Passing round to the right, after emerging from the first two chambers, you enter a second cave of greater extent but not so regular in shape; the roof gradually sloping to the ground. We found some few specimens of malachite in the caves.

Sunday, 20th.—At 4 o'clock, our party returned from Congo, bringing with them 66 carriers; they were six days coming back, and report the roads very bad; they brought several letters for the Chefe and one for us, expressing a wish that we would come speedily, and enumerating a list of articles to bring as presents.

Thursday, 24th.—Started the 66 carriers with an escort of seven men; we were both down so badly with fever that had not the Chefe kindly assisted us in arranging matters we could not have got them away to-day; they have promised to send us more men back from the towns as they proceed.

Wednesday, 30th.—Having succeeded in collecting 30 more carriers, started my brother with six men as escort for Congo on the morning of the 1st of May, and accompanied them as far as the River Loozi, and superintended the crossing; this river is generally insignificant, but owing to the heavy rains had overflowed its banks, and was nearly 90 yards across; there was considerable difficulty in getting the cargoes over, the natives being afraid, as the river in the centre was chin-deep, and but for our own men they must have encamped for the night.

Sunday, 4th May.—There was a conference held to-day with the Soba of Matatu about taking charge and care of the fortress of Bembe when evacuated by the Portuguese; and it was partly agreed that on consideration of his doing so he was to receive 200,000 beads per month, and the Soba of Bonde 60,000 beads. I cannot help thinking it a great mistake to give up possession of a place which is the key to the interior; and a day will yet come when they will repent having relinquished a position that cost Portugal so many lives and so much money to obtain. The moment the troops leave, the road to the coast will be stopped, and Ambriz will suffer a great loss of trade.

Wednesday, 7th.—The requisite number of carriers arrived to-day, and I had fever, unfortunately, too bad to allow of moving, so did not make a start until 9 o'clock on the morning of the 8th. I was exceedingly sorry at parting with the Chefe, who in his kindness and attention to our men and selves has been almost as a brother; he pressed on me from his small store some rice, wine, bread, &c., and accompanied me to the first village, where he embraced me, and wished me Godspeed and good fortune. Our men, I am glad to state, fell in of their own free will, and one of them, acting as spokesman for the rest, thanked the Chefe for his great kindness to them; he seemed much moved at their expressions of gratitude, and said he had never known black men thankful before. Two hours' march north brought us to the Loozi River, which fortunately had resumed its normal condition, being only 9 feet across and 4 feet deep, the stream going to the westward. Crossing the river we passed up through the village and proceeded in a northerly direction for Miembe, where we slept at night; starting at seven the following morning, twenty minutes' walk brought us to the cross roads, one of which leads to Zombo. Here, stuck on poles, were the heads of two men who had a few days previously suffered torture and death for theft; their calcined bones were in the grass and their clothes hung on the bushes; the heads, on which the wool and flesh still remained, presented a very ghastly spectacle. The day's march was principally through long grass with some climbing, the road tolerably good: we descended to the Lafoozi River, and crossed it by a bridge that had just been completed above the rapids; I paid a toll of 12,000 beads for the crossing of the whole party. We were detained here 1½ hour getting the donkeys across and repairing their loads. The men enjoyed a good bath, and astonished the natives with diving and swimming. At 1 o'clock we arrived at Loofoosa, where, as the capatas and carriers belonged to the village, we halted for the night. It is the largest town we have seen since leaving Ambriz, and is tolerably well kept; it musters about 120 guns. Palm-trees are very abundant, and there is good water; but provisions, especially fowls and goats, are dear. The people are quiet and civil. They were very much frightened at first at the donkeys, and did not know what to make of them; but when they saw them quietly grazing and taking food from our men their fear yielded to curiosity, and they crowded round to examine them. The men and women of this town are tall and well made. The chief paid me a visit after dinner, and I explained to him the object of our journey; how Dr. Livingstone had been labouring for more than thirty years, giving up home, country, and friends, and devoting his life to their benefit, and eradicating the curse of their country—slavery. I explained to him the manufacture and use of india-rubber and candles; and that his country supplied the materials, by the cultivation of which and sale to the white man, he would greatly prosper. He seemed perfectly to understand and appreciate the necessity, but replied, that unfortunately he was now very old, and his people were too indolent to cultivate more ground than their wants required.

Saturday, 10th.—We were away this morning by seven, being anxious to cross the Breeze River, which is a large one, before night. For the first hour the road was good though stony, and ascending the hill, we saw the river and direction of the ferry. (An extensive range of mountains commence near Lafoosa, extending in a north-westerly and south-easterly direction, the most prominent peak of which is called Engombo.) Having crossed the Kindamba swamp we proceeded over a stony plain in a northerly direction to the Tende River, which was happily bridged. Crossing it we ascended and passed over the range down through very high grass to the village of Diage, where we had some difficulty with the carriers, who refused to proceed any further that day; and it was only by the application of something more than moral persuasion that they were induced to continue the route. One hour brought us to the Breeze River, the passage of which, owing to its swollen state and strong current, with the unpleasant addition of a tornado, occupied five hours; and but for the courage and skill exhibited by our men, one canoe would have been lost. By 9 P.M. everything, including the donkeys, had crossed; and breasting a very steep hill we were glad to reach the little village of Kingo, wet through, and very tired and hungry. It was too late and too dark to attempt to pitch tents, so we were all huddled together in a semi-roofed hut, through which the rain percolated freely. We made some tea with muddy water; and with that and a few ground-nuts for our dinner, composed ourselves to obtain what sleep might be possible under such circumstances.

We were astir at daylight the following morning (Sunday, the 11th), having passed a miserable night in wet clothes, with empty stomachs, and a plentiful supply of rain; and having changed and dried our traps, moved to the village of Makorko in search of something to eat, which after ¾ hour's march we reached, and found provisions cheap. Being Sunday we remained here the day to rest the men after the fatigue and discomfort of yesterday. I was told by the chief of this village that there are hippopotami in the Breeze River, but the natives have too much fear of them either to attempt to spear or shoot them. This village is frequently visited by leopards, which destroy a great number of hogs. I made an ambush and watched several hours, but without any result, until driven to shelter by the heavy rain.

Monday, 12*th*.—At 7 A.M. started; morning fine with clear sky, but foggy in the valleys and round the trees; by 8.30 we had completed crossing the Buila River, which from the late heavy rains had overflowed its banks and become a swamp of 300 yards, in some places shoulder-deep. After 1½ hour's struggle through high grass we crossed it again, being obliged to fell trees to bridge it, and 1½ hour's further journey brought us to the village of Matampe, where we halted for half an hour, to enable the carriers and men to purchase provisions, which are not procurable at the next village. At this place we were to have met with opposition; but, having previously sent word what course of action I should take if molested while travelling on a peaceful errand through the country, all passed off quietly, although about 100 natives put in an appearance with guns. Shortly after leaving the village we passed the Buila again. The donkeys give a great deal of trouble swimming them across rivers and loading and unloading them: I am afraid they will never be of much service to us. After crossing two pieces of swamp, arrived at the village of Pango, where we passed the night. A man was brought to us here, who stated he had seen the white man we were looking for six months ago at Sundi. This we considered morally impossible, but hoped we might get some information from him. He stated Sundi to be twenty days' march from Congo, or ten days by water, and that he had been sent there by the chief of this village for teeth; when pressed for more definite information, he said we should meet men at Congo who would tell us all we wanted to know.

May 13*th*.—We had a good deal of rain, which lasted till 3 o'clock in the morning, when a thick fog came on. The grass was very wet and uncomfortable for marching: 2½ hours' journey completed the crossing of Manzonje Swamp, which being broad and deep made it a difficult matter to get the donkeys across. We then came to the Malunda River, which, owing to the velocity of the current, occupied an hour in crossing, and proceeded to the village of Lovoo, where we breakfasted; and after wading through the Mobooto Swamp were very glad to reach the village of Kinsanga, for the weather looked threatening, and it was thundering to the eastward: it passed over us in the shape of a tornado three hours afterwards.

May 14*th*.—We were on the move early (had much rain during the night, which makes the road bad for travelling), and passing two swamps and a small river, arrived at the village of Tonkila, where we halted for breakfast and to prepare for the water ahead. We crossed successively a small swamp and river, then the Embombo Swamp, which ranges from knee to breast deep, and crowning the hill, arrived at the village of Ma Lomboo, through it to the Musangany Swamp, and north-north-east to the Koko River; passing round a bend of which we arrived at the village of Maunza, and slept the night. The town belongs to Congo, so we were well taken care of, and, having a comfortable hut to sleep in, did not mind the rain, which came down in torrents.

Started at 6.30 on the 15th, and crossing the Koko River arrived at Kangyakewa, where there is a large and remarkable tree with the initial letter "F. 58" cut on the bark: we put "G. 73" beside it. Passing on, with the river on our left, which is very sinuous and full of obstructions, we entered the village of Kimpango, and halted for breakfast; then proceeded north-north-west and followed the Koko River for about half-a-mile, crossing a small stream that joins it, ascended a hill, and saw the Congo Plateau 6 miles ahead. The ground here was cultivated, corn, sugar-cane, beans, &c., growing plentifully. Anxious to complete our journey, we pushed on, and passing through the village of Kimalo down to the valley, arrived at and crossed the Luaji River, which had considerably overflowed its banks and rendered the passage of it difficult. One hour's march brought us to the village of Ovoonda, where we were met by a number of King Totola's people, and in company with them, after half-an-hour's journey, reached Congo and had an audience, delivered to the King some letters, &c., and then begged him to excuse us a short time while we changed our wet clothes. Returning, we were received with great state: the old King sitting on a chair under a huge state umbrella, habited in the uniform of a Portuguese Lieutenant, and surrounded by his sons and principal chiefs. Chairs were placed for our accommodation, and rugs and carpets spread in profusion; salutations were exchanged amid a flourish of trumpets, tom-toms, &c. He expressed his great joy at being visited by Englishmen, requested to be allowed to salute us with 100 guns, and hoped that we should remain a long time with him, and consider his town as our home in that part of the world, and that many more would follow us, for he was very fond of the white man. After an introduction and general shaking of hands with all the principal chiefs, we were allowed, as it was getting dark, to retire and attend to ourselves, promising to come early in the morning with the presents.

Friday, 16*th*.—While busy selecting cloths for the King, he sent to ask us to shoot a bullock for ourselves and men, and refused to accept more than a hind-quarter for himself. About noon we marched the men to his place with the presents, with which he was very much pleased, saying no white man had ever so honoured him. We considered it necessary to give as much as possibly could be afforded, in order to make a good friend of him, he being the most important person in the country, and whose influence would materially affect our future prospects. In the afternoon he paid us a visit, and we broached the subject of the carriers; difficulties immediately presented themselves—bad state of the roads, quantity of water, danger of being fired upon, price, &c. We managed to dispose of his objections one by one; and it was eventually settled that two of his sons were to busy themselves in obtaining carriers, and he would send a messenger to the King ahead to clear the road for us. We saluted him this afternoon with six salvoes, at which he was very pleased; and sent again to say that no white man had ever treated him so well as we had done, and that he would always do his best for any one who might in future visit him. Congo, or the San Salvador of the Portuguese, is situated on an elevated plateau 1500 feet above the sea-level; it has formerly been an extensive fortified city, surrounded by a loop-holed wall averaging 15 feet in height and 3 feet in thickness, portions of which are still standing. There are also the ruins of a large church or cathedral at the north-west portion of the town. The Portuguese held military occupation for some years, but abandoned it in 1870, and their forts and barracks are now ruins completely overgrown with rank grass and shrubs. The town is supplied with water from a beautiful spring which issues in three small streams from the clay soil half-way down the plateau on the east side of the town. There are very few trees near the town; bananas, plantains, and fowls are plentiful and cheap, and the farms of beans, cassava, and groundnuts are well kept. There are three markets weekly held near the town. The Congoese are great snuff-takers and smokers, are well clothed, and a great many speak Portuguese; they are dark-coloured and of average height, but not muscular; indifferently armed with flint-muskets and knives, and very fond of hunting; they make free use of the knife in their quarrels, not using it as a dagger, but giving long sweeping cuts across the back, breast, and stomach. They are habitually lazy. The women are decently clothed, modest, virtuous, and exceedingly industrious. They tend the farms, look after the house, and cook the meals; whilst the man sits quietly down and smokes his pipe. Polygamy is general in the country, and a man is accounted rich according to the number of his wives, who, as soon as married, select a piece of ground which they industriously farm, the produce being sold at the markets for beads, cloth, &c. The King of Congo has two nephews, and, by the laws of the country, one of them, who shall be the choice of the people, succeeds to the throne: failing a nephew, the people elect a king themselves. The sons of the king do not in any way participate, nor are they entitled to any of his property; but during his *lifetime he can appoint* them to chiefships of towns in his kingdom as vacancies occur. The King of Congo commands the road from the interior to the coast, and levies contributions on all "chiboukas" of ivory. He was once a very powerful chief, and, being supported by the Portuguese, was much respected; but since they withdrew from Congo he has been gradually sinking to the level of other chiefs; and although he keeps up an outward show of authority he has very little power.

May 18*th.*—Had a consultation this morning with two old hunters and the King's son about the different roads, and am convinced that the one to Sundi is the shortest and best. They call it nine days' journey without loads, or twelve days with loads, and say the travelling is good, and that silver and copper are found there.

The Zombo Route, though longer, would have suited us, as there we could have joined ourselves to one of the large chiboukas which go annually towards the Manueyma country to purchase ivory (they number from 500 to 800 strong, and are all armed); but unfortunately there is a big palaver between the Congo and Zombo people at present, about the murder of a man. And again, at this time of the year, there is a great deal of water; in one day's journey alone we should have to cross seven unbridged streams; and as we have already between Ambriz and this had plenty of the element which has been productive of fevers, colds, and rheumatisms, it would not only be more expeditious but more healthy to take the direct road. The rains still continuing are a great evil to us, as the grass burning cannot commence, and it is some 8 or 10 feet high; and the paths are so overgrown that you have to push your way through (which is very laborious work), and get thoroughly soaked into the bargain. They say there is plenty of game on the Sundi road, but, owing to the long grass, very difficult to find.

Monday, 19*th May.*—There is still great trouble about the carriers; they keep putting us off from day to day with endless excuses, evidently meaning to detain us, and get as much as possible out of us. Went to the King, after breakfast, and reminded him of his promise to speedily procure carriers for us. He replied it was true, and that he was doing his best to make the road clear; and would on the morrow despatch his most trustworthy son to the King of Makouta, if we would pay his expenses and send some presents: to this, of course, we readily agreed, and offered to send two of our interpreters with his messenger; but he said "No, it was better he should go alone." Had to listen to another "canard" to-day about a white man, who was in the interior trying to come to the coast, and that people took him ivory and other things to buy, but he replied that he did not trade. The last accounts of him were that he had built himself a town, had fifty soldiers with him, and was making farms to grow produce to sell and pay his way to the sea. They say that he is only one month from this on the right bank of the Quango River. This story, with slight variations, has been repeated by several, who declared they had been close to the place; but when asked to describe the man, they replied, not themselves, but their masters had seen him. There are no travellers in this part of the country; for when men have been brought before us, said to come a long way from the interior, and we have produced the map, and questioned them about the different places, we have invariably found them to know less of their country than we did, and that their long journeys were pure fiction. Small-pox is getting very prevalent, and fatal cases occur daily. How much I regret we have no vaccine matter with us; the natives do not seem to understand the treatment of the disease, or the precautions to be taken to prevent infection, and I am afraid it will make sad havoc amongst them. Thank goodness, all our men have been vaccinated. I went to the King and explained what measures he should take to arrest the spread of the disease, and he has promised to adopt them. He told me his eldest son, who was to have accompanied us, was taken ill with it to-day.

Sunday, 1st June.—We have had no rain since the 28th, and may fairly suppose that the fine season has set in, for the heavy morning fogs which herald its approach have already commenced. We are getting very impatient at this continued delay, and have not ceased urging upon the King the importance of an early move. To-day his son returned from Makouta; but he has to tell his story to the King before we are allowed to hear what he has done.

Monday, 2nd June.—The King came round to see us this morning, and we were at him again about the carriers. He says he is very angry with the son, who went to Makouta, for delaying so long on the road, and not carrying out his instructions properly. We made him give his statement of proceedings in the presence of his father; which was to the effect that the King of Makouta had received our presents, and was very glad to hear that Englishmen were coming to his country; that he would come himself to hear all about us from the King, and would be here in five days, bringing carriers with him.

Saturday, 7th June.—Our patience has been sorely tried with unsatisfactory excuses and delays in procuring the carriers, so had a long and serious talk with the King about his conduct in the matter. He *would insist* that the road to Sundi was very dan-

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gerous, and that the people would fire on us all the way, and not give us time to eat or sleep. After two hours' palaver, he at last promised he would furnish carriers to Makouta; but he would send messengers to Bembe and Loanda, to say that we would go where we were sure to be shot, and they were not to blame him for what might happen to us.

Friday, 20th June.—After innumerable delays and vexations enough to try the spirit of any Job, we have, at length, succeeded in collecting and paying the carriers, and managed at 5 P.M. to get away from Congo; and after an easy march, in a northerly direction, arrived at the small village of Kikembo. I began to fear we never should get out of Congo: the disaffected people were constantly bringing in reports that chiefs whose towns we were to pass had sent word that they intended to fire upon and exterminate the whole party, and therefore carriers had better not come with us. These, and like stories, which it would be tedious to repeat, lost us a whole month of the best season of the year. We insisted upon the King punishing one man whom we had caught setting his countrymen against us, and preventing the carriers from offering their services. We went before leaving, to wish the King good-bye, and make him a parting present. He was very thankful; and begged us to think that he was our great friend, that his heart was right, towards us, &c., that he had done his best to get us forward; but his people kept the carriers back by circulating lies about the dangers of the road; that we would eat them when we got them far away, and never allow any of them to return to their country.

Saturday, 21st June.—Did not get away till late, owing to some of the carriers having returned to Congo for the night. Half an hour brought us to a gorge, through which we passed, and down the high level of a valley, hills nearest on the right hand, with outcrop of granite. We can plainly see that this would have been a very bad road three weeks earlier, the valley would have been a swamp. The grass is similar to that we met with from Bembe to Congo, where you pull your hat well down over your eyes and take a header, emerging only when you arrive at your destination; nothing to be seen above the wall of grass but the heavens, and often not even that. The sun was very hot to-day; and after an hour's slow travelling, the carriers came to a halt at the head of the valley. They are a miserable lot, stopping every five or six minutes. After many delays we reached the village of Kintano, where we halted for the night; had a visit and present from the chief, and took the opportunity to explain all about ourselves and our mission, and managed to do away with the bad impression existing in their minds about us. We were well pleased, for this was one of the towns named where we should meet with opposition; and instead, we have been well received, the carriers have taken heart, and now talk very courageously.

Sunday, 22nd June.—Started at 6.30, and an hour's journey brought us to the Loanza Swamp, which occupied an hour in crossing, owing to the difficulties of getting the donkeys through the slush and mud. Passing up to and through Banza Loanza, in five minutes we reached another swamp; crossing which we arrived at the village, where we found the chief, who, by special desire of the carriers, had been sent ahead with presents to clear the road, and was to have met us at Makouta.

We were detained here 45 minutes, while I explained to the carriers and town-people the rascality of the old man. Forty minutes' further march, and we reached the Pambala Swamp, which was, happily, partly bridged. Crossing this, we proceeded to the village of Luquakwa, which I was very thankful to reach, having been in a hot fever for 2 hours. After a rest and refreshment, again took the road, and after 2 miles' march, arrived at and crossed the Nyangetta Swamp, and, breasting the hill, entered the village of same name, where we halted for the night. Resuming our march the following morning, a short journey in a north-easterly direction, over hill and dale, brought us to Banza Tanda, a town of some consequence, situated on the crest of a hill, surrounded by trees. Here the natives turned out with their guns (about 130), thinking we had come to take and burn their town; but a short explanation convinced them our visit was a friendly one. The country is improving in appearance; clumps of trees are more frequently met with, and the palm is abundant. The people of this town trade to Vokay and Noki, with ground-nuts and palm-oil. We found provisions rather dear. Detained here one day with bad fever.

25th.—We continued in a north-easterly direction for Kilembella (the road good with less grass, but a great deal of climbing), which we reached in a couple of hours. I received a very extraordinary message from the King of this town, asking me to order my men to wear their trowsers, as they did not consider the handkerchiefs, which the men usually wore on the march, sufficient clothing. I could not help smiling at this excess of modesty, but, nevertheless, satisfied his whim. We were kept waiting an hour before admitted to an audience, during which time it was evident, by the King's appearance and manner, his people had been priming him with palm-wine. He was a fine, tall, muscular-looking man, but being very drunk, was quite the savage, dancing and capering round us like a big baboon, and flourishing a rusty old sword, declared that no man was to move out of his town under penalty of death. Foreseeing the effect this was likely to have on the carriers, we endeavoured to arrange a large present for him and proceed; but the threat had already taken effect, and the carriers were bolting from the town *en masse*, and by 8 P.M. not one was to be found. Here was a dilemma. These men had been paid to take us to Makouta. King Totola had made them a long speech before leaving Congo, urging them to fulfil their contract, and sending his own secretary and two principal chiefs on purpose to give them confidence, and yet by a few words from the mouth of a half-drunken man they had melted away. One chief, who volunteered to accompany us from Kikembo, alone remained faithful; but he was forcibly dragged away by his own people. Of course, we were very angry at such conduct on the part of the King, and the following morning early, when we thought he was sure to be sober, we sent for him and explained how shamefully he had behaved. But expostulations were useless; he declared it was all a mistake; that he had been told the carriers were to leave us here—this being the limit of the King of Congo's territory—and that his people were quite capable of taking us to Makouta. Finding we were trapped, the best plan was to put a good face on matters, and tell him that as we were anxious to proceed, if he would collect the carriers without delay, we would give him a handsome present. Kilembella is a considerable town on the borders of Congo (this new kingdom extends as far as the Quilo River, when you come upon the Makouta territory). It is situated on the top of a hill, with water round. There are large groves of palms, and ground-nut farms, but no corn, plantains, or bananas, which is rather remarkable. Two good markets near, which are well supplied. There are two varieties of bean—the ground (creeping) and tree-bean; the latter is sometimes left for two years before cut down. This place could produce a large quantity of palm-oil annually. We explained this matter to the King, and gave him a candle, telling him that was made from the stearine, and that if he chose to manufacture the oil and send it to the English factories, he would obtain a good price. He replied that he had no idea they would purchase it, but that he would now give his attention to it, and send 40 loads to Boma as a trial; he is also going to try and grow corn and bananas.

Saw several green pigeons and two grey parrots: cardinal birds have disappeared; Congo and Bembe abound with them. The grass is beginning to get a brown tint, and ought, I should think, soon to be burnt. They say after passing Makouta it is less high and less plentiful; we are thankful for that news. Makouta, from all accounts, is the land of plenty; this certainly is not. One would hardly credit we could have travelled from Ambriz to this without killing some game. The houses of Kilembella are badly kept, and the yards never swept. Some women hide the bosom, others not; but all are decently clad. The country round is so broken by hills and valleys, that it would be a matter of considerable difficulty to find a level of 6 or 7 acres. Villages are very numerous between Congo and this on both sides of the road.

It was not until the 5th of July that we were enabled to satisfactorily arrange the number of carriers, their payment and presents to the King and chiefs. To prevent, if possible, being again deserted by the carriers, we subsidised the King of Kilembella, and brought him with us, also his secretary and his son.

One hour's slow travelling in a northerly direction is the village of Keweve, the approach to which is through the finest bit of wood we have seen; the trees large, lofty, and abundant, affording a grateful shade. The village rests on a hill, is large, and well built, and very clean; streets regular, and swept; in fact, the place had quite an air of civilisation about it. One hour and a half farther journey and we were at Mokumbo; here reside the family of the King of Kilembella. This village was also well kept, and there were plenty of fine sheep, also goats, pigeons, and fowls. Passing through the village, and emerging from the trees, we saw to our right the mountain range of Zombo, with a plain some 12 miles in extent intervening. The day was very warm, and the carriers were a good deal done up when we reached the village of Onza; which, although belonging to our King, refused at first to allow us to remain (some malicious natives having spread reports calculated to deter us); but after a long palaver, and taking into consideration that the sun had already set, they allowed us to halt. They cultivate large quantities of corn (maize) around this town, and we noticed fields of it near the villages we passed to-day.

July 6th.—We reached the town of Moila, the chief of which is a son of our King; the men and women took to the bush on our arrival, and it was some time before they could be coaxed back. The following morning the chief paid us a visit, and made a present of a sheep. We remained the day, as there was a market held ahead, and the chiefs were afraid that the drunken men would be firing on the carriers. They held a grand "batook" in the town, which lasted till past midnight; these country people are very fond of dancing, at least the male portion, and think nothing of keeping it up all night when the moon will give them light enough.

Leaving Moila on the 8th of July, we arrived at the village of Mokanda, after crossing a swamp and two rivers; we made but a short march, but the carriers refused, in spite of the King's commands, to proceed any farther. We observed recent tracks of elephants on the road, but the grass is too long to attempt to follow them; after we arranged everything for the night, went to one of their drinking-places and watched for some hours, but with no result. The carriers are beginning to get uneasy, and I hear it is their intention to leave us at Vindu to-morrow. Started early in the morning (9th), and passing through the village of Lovoo, we hastened on to Vindu, to be ahead of the carriers, and pack the loads as they arrived to prevent any plundering. They kept us waiting for an hour outside the town, which is very extensive and well built, situated in the middle of a large clump of trees. Before the chief's house is a large square, where a "batook" was going on. Could not have an audience with the chief until our own King arrived, and he did not put in an appearance until very late, so all exchange of presents had to be settled in the morning. Went out to look for elephants and caught fever.

On the morning of the 11th started for Banza Umputa; had a good deal of high grass to push our way through to-day; but, fortunately, only one small river to cross; arrived in good time at the town. Here we heard that it was the intention of the carriers to leave, notwithstanding the extra payment we had made them at Vindu.

July 12*th.*—During the night and morning most of the carriers decamped; some mischievous person having industriously spread the report that as soon as we crossed the river Quilo the natives would fire upon us, and cut the bridge to prevent our retreat, and that the King of Makouta had collected all his men to oppose our advance; and although we did our best to convince them that no such thing would happen, that the King of Makouta had received our presents and invited us to come to him, and was therefore our friend, our words were without effect, the stampede had commenced, and nothing could arrest it; the only plan, as time was so valuable to us, was to set to work immediately to procure others. There was a great hubbub in the square to-day between the chief of this town and our King's secretary, who was advising the remainder of the carriers to bolt, the chief saying he would post his men on the road and shoot the first carrier that attempted to pass. At 2.30 the chief of Vindu arrived with seventy carriers;

and considering that was exactly the number that bolted last night, it looks uncommonly like an arrangement between our King and the chief of Vindu (who is his brother), or the people of that town and our carriers. There was great trouble in settling with the new men, who wanted the same quantity of cloth that we had originally given at Congo to come the whole distance; but as the journey had already been paid for three times over, it was necessary to make a fight for terms and reduce their exorbitant demands.

On the 15th of July we made a start, and in half an hour reached the Quilo River, which we crossed by a native suspension bridge, exceedingly strong and well constructed of monkey-rope; it would bear ten carriers with loads, but oscillated so that many of them preferred crawling to walking. The river was very low, being the dry season: it is said to be swarming with alligators, and we were afraid we should lose some of the donkeys in swimming them across; but fortunately got them over safe, about half a mile below the bridge where there was less water. Having paid four pieces of cloth to the chief of Banyanga, who collects the bridge tolls, we passed on through his village, and crossing the Luanga River reached the town of Lāquā, where we remained for the night. After crossing the Quilo River, the aspect of the country changes; there are remarkable and abundant outcroppings of limestone rock, some rising abruptly from the grassy plain to an altitude of 100 feet, and from their weather-beaten appearance resembling rocks in the sea. The soil has also changed from brown to blue clay, of which the native pots and pipes are manufactured at Makouta. The following day we passed through a large grassy plain (a swamp in the rainy season), and reached the small village of Muncola, where the carriers came to a halt, and positively refused to proceed any farther; and when we sent for the King, he said it would first be necessary to send a messenger ahead with a present and await his return. To guard against excuse for the carriers bolting, this was done; but then no guide could be found under any promise of payment to take the messengers to Tungwa; fortunately we had one man who knew the road, and he with three others were sent. They returned at 8 P.M., having delivered the present to the chief, who said it was all right; but that as our present to the King of Makouta had miscarried, and he was the principal, we must send him another, which was accordingly done, the men starting early on the following morning. Shortly afterwards there was a free fight, with knives and sticks, amongst the carriers, and then word was sent us that they must have three fathoms more each before they would move the cargoes. An offer was made them of four pieces of cloth, which some were inclined to accept as it was only 2½ hours' farther journey to Tungwa; but in the middle of the negotiations, a messenger arrived, stating that our King and all his followers were bolting out of the village as fast as their legs could carry them, and, of course, the remainder of the carriers immediately followed suit. We sent, and the chief of the town also, to stop the King, but to no purpose. At the time we were at a loss to account for this sudden stampede; but heard afterwards that word had been sent to the King of Kilembella, that if he attempted to go to the chief's town with us his head would be struck off. Being anxious to reach Tungwa as speedily as possible, I started with one man, and after a smart walk of 2¼ hours arrived at the market-place, where I was requested to wait until my arrival was announced to the chief. Shortly there arrived a head-man with about forty of the townpeople: he told me they were busy with the burial of the chief's son (which accounted for the firing of guns and tom-tomming that was going on), that in the name of the chief he was very glad to see me, but could not understand what a white man was doing such a long distance from the big water. I explained our mission, and requested him to ask the chief to supply us with carriers to bring us on without delay, and asked to be allowed to enter the town and visit the chief; he returned, promising speedily to send an answer. I was kept waiting till after sunset, when our own messengers returned, bringing back with them all the presents that had been sent, with a message to the effect that we must not pass by that road, as their father had forbidden it, and that they would not supply us with any carriers. As nothing more could be done that night we returned to the village of Muncola; and the next morning went again to the market, accompanied by the chief of the village and three or four men, bearing presents, and invited the chief of Tungwa to a council to state his reasons for refusing the road, after receiving our first messenger from Congo, accepting the presents, and inviting us to come. The palaver lasted nearly the whole day, and ended most unsatisfactorily. They would not accept our presents, nor give us carriers on the road; their father had forbidden it, and therefore the matter was out of their hands. Finding no amount of coaxing or presents would have any effect upon them, we concluded it better to return to Muncola and arrange carriers to take us to Kinsuka, and skirting the territory of Makouta, reach Sundi or some other part of the river. We were the more inclined to adopt this plan as the season was already well advanced, and time was of the utmost consequence to us, if we intended to be of any assistance to Dr. Livingstone. Had we not been encumbered with baggage, we might easily have pushed past these people and gained the river: but our duty was plainly to reach the Doctor with sufficient goods for his party and our own.

Tungwa is by far the most populous and best built town we have seen; the streets are regularly laid out and cleanly, the people are ivory traders, and the whole place has an appearance of prosperity. Our interpreter said the chief had in his house chairs, tables, and every article of European manufacture that is traded with, and lives in comparative luxury: he looked upon our presents as being very insignificant. The estimated population is about 1600. The river, which rises from a fountain about 8 miles to the eastward of the town, flows round three sides of it, the fourth having a background of hills, the slopes of which are cultivated. The banks of the river are thickly wooded, and bananas and palm-trees abound round the town. Since crossing the Quilo River we have noticed the natives are smaller in stature and of a lighter colour, this being especially remarkable with the Tungwa people. Banza Makouta, the residence of the King, is a large manufacturing town, lying in a valley to the northward of Tungwa: it is noted for pottery, pipes, mats, and grass-cloths. The surrounding country is very fertile and well cultivated, producing sugar-cane, corn, ground-nuts, mandioca, yams, beans, &c.; poultry, sheep, and goats are also plentiful. The River Tungwa flows past the western portion of the town. The chief of Muncola gave us a great deal of trouble, would not allow his people to sell us any provision, and was constantly sending us threatening messages, and delayed procuring us carriers until he found we were determined not to leave until he found the men. After four delays we succeeded in obtaining the requisite number, and began in the morning retracing our steps, reaching Lāquā in a few hours, where the carriers all bolted from us again; but as the chief immediately offered to supply their places, it was easy to see what arrangement had been arrived at. Unfortunately it is the custom of the country to make all payments before starting. We often foreseeing the inconvenience of it, and how completely we were at the mercy of the chiefs and carriers, tried to break through the custom, but to no purpose, they would not touch a cargo until all had been paid for—the usual trouble here; and as the distance to Banza Umputa was only a little over 4 miles, we determined to move the cargoes with our own men, seeing which the natives rushed in a body and cut the bridge over the river. This was rather too much of a joke; so I marched, revolver in hand, to the chief's house, and taking possession of him, gave him to understand that unless it was repaired in twenty minutes, I would shoot him and burn his town. He disclaimed all knowledge of the affair, and had the bridge hastily repaired, the carriers accepted the cloth they had already refused, picked up the cargoes with alacrity, and hastened on; but the moment they had crossed the Quilo River by the bridge, they dropped their burdens and ran for it, and we were some hours collecting it all at the Banza. The following morning we started four men, accompanied by two appointed by the chief of this town, to Kinsuka with presents and a demand for carriers; they returned next day, having reached as far as Zonzo (the next large town to Kinsuka), the chief of which refused our presents, saying the King of Makouta had sent him word that we had been refused the road, and asking him not to allow us to pass by his road. He said he was sure there was something wrong about us, or the King of Kilembella would not have run away at Muncola; that he did not trade, or his people; and he was perfectly satisfied to wear country cloth and use native mats; he did not want our presents or us in his country, and we had better go back to Congo and try some other road. Thus was our second chance lost; but knowing the influence of the King of Congo, and mindful of his promise to come in person and assist in clearing the road, I sent immediately to request him to come and bring with him the required number of carriers, as these people would not furnish us with any, except on condition that we went back, and we were naturally anxious to retain a position which had cost so much time and cloth. While the messengers were on the road to Congo, acting upon information, we despatched men to Tungwa with additional presents, and after five days' delay (during which time all manner of conflicting reports were received) they returned. A meeting of the chiefs took place, and they discussed our request for the road; the King of Makouta did not attend, but both he and the father of the chief of Tungwa refused to allow us to advance. The young chief who commands the eastern portion of the town sent me word that if we would return to Congo and procure 200 soldiers, he would "pat his stomach" (equal to an oath, and more binding) to me, and carry me with his own men to any place on the river I chose to name; he said he would first kill his father and burn his town—nice youth—and then dare the King of Makouta to interfere with him. Out of all the presents I sent by the son of the King of Congo—Lema—to the King of Makouta, he only received 8 fathoms of cloth, the remainder having been disposed of on the road. The messenger from Congo arrived, bringing intelligence that Congo town had been almost cleared out by small-pox; that the King was very ill with it, and all hope of assistance from him was at an end; so there was nothing left now but to speedily retrace our steps to Congo, and thence by the Embomma road to the river, and up the left bank. It was very disheartening to be thus thrown back, with the season so far advanced and the prospect of being dropped frequently on the road; but it could not be avoided, and we commenced collecting carriers at once.

We have found these country people to be exceedingly timid, superstitious, and suspicious, always imagining evil of us, although we acted in the most straightforward manner towards them, concealing nothing of our intentions, and mixing freely with them in order to accustom them to the white man. They thoroughly believed at Tungwa that we had come to find out about the ivory trade, and look for copper and silver at Sundi and Opombo, as the Portuguese had done at Bembe. In estimating the population, they take no account of the women and children, but only those who bear arms. Banza Umputa musters 136 men, of whom 130 have guns. They have five seasons to the year, which go by 2½ months. They reckon twelve months to the year: July, August, and half September, they call "Sevoo," or summer; half September, October, and November, "Bangala," or dry season; December, January, and half February, Māsanzā, or winter; half February, March, and half April, "Kundey," heavy rainy season; half April, May, and June, "Kintombo," or spring. Bangala commences when this (August) moon is finished. No rain falls until Bangala is finished; then follow two months' light rains, and then the heavy rains. September is the month for burning the grass all over the country, and it is also the hunting season; very few of them travel during that time. They calculate thirty days to the month. The marriage customs are rather peculiar. As soon as a young man has built himself a house, and can assure the parents of the girl that he has sufficient money to keep a wife, he can marry. Girls are betrothed at their birth, and the intended husband continues to make presents to the parents and give clothes to the girl until she arrives at the age of puberty, when she is handed over to him. In the event of a married man dying, if he has a younger brother, his estate and wives are handed over to him; if there is no brother, the wives go back to their parents, and the children are supported by the deceased man's family, and his property sold. They keep no account of the children's ages after they are two years old. A man is not allowed by "fetish" to cohabit with his wife, after the birth of a child, until it can walk alone. In every village there is what is called a young man's house. When a boy is about eleven or twelve years old he leaves his parents' house for this place (only returning for his meals), where he lives with the other young men until he marries. When chiefs are in mourning they never wash their faces; and, according to the degree of relationship, the period extends from three to twelve months. Pawning is carried on very extensively: a man will pawn his child, his gun, or his knife, to procure cloth or beads, when hard up, and if the pawnbroker does not choose to demand repayment, with interest, of what he has advanced, the property becomes his absolutely. Palm-trees are abundant, and average five bunches of fruit, equal to a gallon of oil, without taking into account the nuts, and bear two crops annually. This is all wasted—they say it is too much trouble to make it—and they are quite content with what they make by their ground-nuts. The country from this to the north and east is more open, the valleys are not so deeply undulating, the soil is rich, and, under cultivation, capable of producing anything.

After the usual delays and palaver, &c., we commenced our march on the 15th of August for Congo, which we reached on the 29th of the same month, having been deserted by the carriers three times on the road. Here we found a wretched state of things: the King very ill, half the town dead, and everything looking very desolate; houses nearly all shut up. The men have disappeared, and the women wander about the town neglecting their farms and plantations. All is hushed: the clink, clink of the blacksmith's hammer, which so often reminded us of the villages at home, is no longer heard. I passed by his shed to-day, and found it ruined and deserted. There lay the anvil and the tools, and the remains of the charcoal fire; but the presiding genius, where was he? Gone, alas! like many, to the home of his fathers.

It was not till the 10th of October, owing to the great mortality amongst the carriers, that we were enabled to make a start from Congo for Banza Noki, where we arrived on the 22nd of the same month, having great trouble with the carriers on the road, who eventually deserted us at Banza Vokay, and we were compelled to employ fresh ones to reach the river. Here (Lucango) we found ourselves among friends: Mr. Pardo, of Boma, having a factory at this place, and he kindly placed the house at our disposal. We found the river had already risen 4 feet, and they say it continues to do so until the 21st of December, when it begins to fall. There is a steady current and stream at present of about 5 knots, breadth 850 yards. Finding after inquiries that the kings on this side of the river would not allow us to go to Yellalla, we crossed to the opposite shore, north side of the river; and, having pitched the tents, erected huts, and housed the baggage, we paid some visits to the neighbouring kings to arrange carriers, but they all stated that the season was too far advanced, the rains had already commenced, and they could not supply men until they were over. Finding, after repeated attempts, that nothing could be done, we commenced preparing our winter-quarters; cleared some land, and planted it. We remained here until the 11th of December; but as the natives would no longer sell us food, and we could not catch enough fish or shoot game to keep us, we were compelled to break up the little colony and go down the river to Mussuco, where we were very hospitably received by Mr. Pardo, who was just re-opening a factory there. We built houses for the men, and had a store-place at disposal for the cargoes.

We remained at this place until the 10th of April. During the time made frequent excursions to the different chiefs both on the north and south banks of the river, negotiating for the road; and eventually succeeded, by making very handsome presents to Anelongo (the King of Banza Noki), in gaining him over. Commenced moving out of winter-quarters on the 10th of April; and on the 17th of same month heard with profound regret of the death of Dr. Livingstone through Captain Hopkins, who ascended the river on purpose to meet us and give the intelligence. But conceiving it our duty to proceed, we pushed on, and had just completed arrangements for crossing the river above the falls, when the letter of recall from the Society overtook us; and, complying with instructions, we, with many regrets at the idea of leaving our work unfinished when all seemed so full of promise, commenced preparations for the return, leaving good presents with the chief in order to procure a good reception for those who might come after us. The Congo, which is one of the grandest rivers of the universe and still unexplored, is navigable for steamers to a distance of 110 miles from its mouth even in the dry season; it floods twice annually, the first and great rise taking place from 10th December to 23rd December; the second from the first week in March till nearly the end of June. In 1873 it only rose 9 feet 6 inches with the first flooding, and 2 feet with the second. A very low run was expected at the end of August of this year, owing to the small quantity of rain which fell. There are hundreds of canoes on the river, some of them capable of carrying 3 tons of cargo; and a very large trade in nuts and oil is carried on with them between Boma and the towns and markets above the factories. The natives are very skilful in the handling of their canoes, yet a great number of lives are lost annually through the swamping of their frail craft by whirlpools. They stand to paddle, singing the while; the large canoes have two men to steer and six to paddle. They choose the early morning for descending the river, when there is no wind. The fishermen use nets shaped like a spoon; they select dark nights for their work, one man holding a lighted brand over the water whilst the others dip up the fish, attracted by the glare, with the net.

For the guidance of future travellers in the Congo country, I would suggest that all carriers be engaged at Sierra Leone, where any number can be obtained for 1*s.* 3*d.* a day. From my experience of them I can safely say they will be found to answer every requirement; and the employment of them would render an expedition entirely independent of the natives, who by their cowardice and constant desertions entailed upon us heavy expenses and serious delays.

Mr. MONTEIRO regretted that Lieutenant Grandy did not pierce further into the interior, so as to obtain some idea of the course of the Congo. His own observations in Angola, to a distance of 150 to 200 miles inland, seemed to point to the conclusion that the Congo suddenly takes a bend south, and drains the whole of the country at the back of Angola to at least 15° south latitude. Throughout the whole of that region there is not a single river worthy of the name. The land rises gradually from the sea coast until it becomes a sort of plateau, similar to Young's Land. He did not think the Congo came from the north, as there are four known rivers in that direction. The period of the Congo floods, too, corresponds with the rainy season in Angola.

Lieutenant GRANDY, in reply, said he believed, with Mr. Monteiro, that there was a southern branch of the Congo. The information he obtained from the natives was that it was called Coanga by some, and Quango by others. It was, however, equally possible that the Congo had a northern feeder as well. This conclusion was arrived at from the second flooding of the stream, which only gives a small rise of about 2 feet. It was, however, almost an impossibility to obtain any information about the interior from the natives, who are excessively suspicious of Europeans. Immediately a question is put to them, they imagine that there is some sinister motive connected with it, and either evade giving an answer or tell a palpable untruth. The only traders in the country at present are those who travel with large caravans from Zombo, crossing the Congo somewhere in the neighbourhood of Sundi, and advancing towards the Manyuema country. It was evident that they are accustomed to encounter considerable opposition, because they travel from 500 to 800 strong, all armed. They make their trip once a year, going and returning in the dry season. He met one such caravan of 500, while staying at Congo, and questioned them particularly about the interior, but could get no satisfactory answers. So long as an expedition is dependent upon the natives for carriers, failure must ensue. Carriers should be obtained at Sierra Leone, or some other port on the coast, and should be well armed. Unless such precautions were taken, it was impossible to penetrate into the interior.

The Rev. HORACE WALLER said that he had received that evening the last portion of Dr. Livingstone's map—a little slip bearing on his route from the East Coast to Lake Nyassa. It was very much stained and travel-worn, but it would no doubt afford the missing link to the map of that region. In the Doctor's original pocket-book there was a little sketch of that part of Tanganyika which Lieutenant Cameron had recently visited, and in that sketch the river Logumba was made to flow into Tanganyika.

The PRESIDENT: After that, he states that it flows out.

The Rev. HORACE WALLER said it was most unfortunate that the names of the rivers were so much alike. In many cases, too, the same names were repeated several times. It was impossible to deal with such a difficult question on the spur of the moment, and he trusted that an opportunity would be afforded for renewing the discussion at a future date. It would be fair towards the subject in general, and Lieutenant Cameron's statement in particular, to defer it till his maps and journals were in the possession of the Society.

The PRESIDENT said that this identity of the Lualaba with the Congo was a very interesting question, and was practically the only remaining great problem to be solved in African geography. All the evidence that had been collected, especially by Dr. Behm and Mr. Keith Johnston, as to the physical geography of the country, seemed to render their identity as nearly a matter of certainty as anything could be that had not been tested by observation. Great credit was due to Lieutenant Cameron for what he had done, and also for recovering Livingstone's papers, which otherwise would have been left at Ujiji for any chance traveller. With regard to Lieutenant Grandy, he was sure the Meeting would return him their very best thanks. That he had not been more successful in his attempt, was owing to no fault of his. It really did seem as if it were an absolute impossibility to pass into the interior to the south of the Congo, unless the expedition were supported by independent porters and attendants. From what they had heard of Lieutenant Grandy's experience, it was very unlikely that the German expedition would meet with success. If they proceeded to the north, they no doubt would be more likely to prosper.

Lieutenant GRANDY said that the last news he heard before leaving was that the German expedition had been thrown back.

Fourth Meeting, 11*th January*, 1875.

SIR RUTHERFORD ALCOCK, K.C.B., VICE-PRESIDENT, in the Chair.

ELECTIONS.—*William Powell Branson*; *James Broadmead*, B.A.; *Andrew Cassels* (Member of the Council of India); *Alfred Craven*; *Edward Maynard Denny*; *Lieut.-Col. James Henry Dowling* (Gloucestershire Engineer Volunteers); *Joseph John Dunstone*; *Matthew Hamilton Gray*; *Alexander S. Harvey*; *Augustus John Harvey*; *Charles Heneage*; *Frederick Hollebone*; *Captain John W. Hozier* (Scots Greys); *Colonel Archibald Impey-Lovibond*, R.E.; *Edward Marston*; *P. Venkatakrishnama Naidu*; *William Nesbitt*; *Staff-Commander D. Pender*, R.N.; *Rev. John Eade Pryor*; *Thomas Alex. Ridpath*; *James H. Russell*; *Arthur William Sadgrove*; *Rev. Robert Salthouse*; *J. C. Stirling*; *Edward Swain*; *Lieut.-Col. William Tedlie*; *Captain Frederick Trench Townshend* (2nd Life Guards).

PRESENTATION.—*F. A. Gwynne, Esq.*

DONATIONS TO THE LIBRARY, 14TH DECEMBER, 1874, to 11TH JANUARY, 1875.—Tenth Report of the Board for Protection of Aborigines, Victoria, 1874 (*The Australian Government*). Observations sur l'Helix ligulata de Madras, 1869, and Quelques Observations sur le Hyalæa tridentata, 1873; by A. E. Craven (*Author*). Quarterly Weather Report of the Meteorological Office, Pts. III. and IV. (*The Meteorological Committee*). Researches and Excavations near Moa-Bone-point Cave; by Julius Haast, 1874 (*Author*). Italy: Handbook for Travellers; by K. Bædeker: 2nd part, Central Italy and Rome, 1875 (*Publisher*). Tableaux de Population, &c., pour l'année 1871, 1874 (*The French Marine Minister*). The History of Japan; by F. O. Adams; Vol. II., 1875 (*Author*). U. S. Hydrographic Office: The north-west and west coast of Spain, No. 52, 1874 (*U. S. Hydrographic Office*). Discorso del Comm. Negri Cristoforo nel Circolo Filologico di Firenze, 1874 (*Author*). Copy letter respecting lumber capabilities and fertility of neighbourhood of the Gander River, Newfoundland; by A. Murray, 1874 (*H.M. Secretary of State for Colonies*). Copy letter from Lieut. Cameron to Earl Derby as to outlet of Lake Tanganyika, 1874 (*H.M. Secretary of State for Foreign Affairs*). Anatolica, or Journal of a visit to ruined cities of Caria, Phrygia, Lycia, and Pisidia; by the Rev. E. J. Davis, 1874 (*Author*). Selections from Records of Bombay Government, Nos. CXLI. and CXLII., 1873, and Selections from Records of Madras Government, No. XXXIX., 1873–74 (*H.M. Secretary of State for India*). Geschiedenis der Noordsche Compagnie; door S. Muller, 1874 (*Author*). Fortification passagère: Traité des applications tactiques, Parts I. and II.; by H. Girard, 1874 (*Author*). 'Confederation in S. Africa' and 'Delagoa Bay;' letters by G. Thompson, 1874 (*Author*); and the current Issues of corresponding Societies, &c.

DONATIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF DECEMBER 14TH, 1874.—A Map of a portion of Central Africa. By Dr. Livingstone, from his own surveys and observations between the years 1866 and 1873. Two copies. (*John Murray, Esq.*) A Map of Western Australia, showing the route of E. Giles in 1873–74. Compiled at the Surveyor's Office, Adelaide. (*F. S. Dutton, Esq.*) A MS. Chart of the River Quanza, on the west coast of Africa. By Carl Alexanderson, 1873–74; on 5 Sheets. (*Captain David Hopkins.*) A Plan of the Port and Town of Yquique, on the west coast of South America. By R. Escudero, 1861. (*C. R. Markham, Esq.*) Plan of the City of Lima. By R. V. Jouanny, 1872. (*C. R. Markham, Esq.*) 950 Sheets of the Ordnance Survey, on various scales, accompanied by Area Books. (*Through Sir H. James, R.E., Director of Survey.*)

The CHAIRMAN, in introducing the subjects of the evening, said the first communication on the list was one which had only been that day received. It was from Colonel Long, containing an account of his journey to the Victoria N'yanza. Colonel Long was despatched by Colonel Gordon, on a mission to King M'tesa, and had given a most interesting description of the route he followed. The second paper was by Captain Elton, on his journey to the Delta of the Rufigi. Although that district had been recently described by Mr. Stanley, with his usual graphic power, Captain Elton's paper would be found interesting, inasmuch as his journey was undertaken a year previous to that of Mr. Stanley. It differed in some points from Mr. Stanley's account, and possibly might be found to be more accurate. The last paper would be one by Mr. St. Vincent Erskine, on a visit to Umzila, south of the Zambesi. Mr. Erskine had explored entirely new ground, and filled up a portion of the map of Africa which previously was a blank. He had the misfortune to lose his journal and observations, in crossing a river when on his return; but he preserved his map, which would be a credit to any geographer, from the care with which all the points were laid down in it. He had the map about his person when his journal was lost, so that the practical results of his exploration had been preserved.

COLONEL LONG'S MISSION TO KING M'TESA.

The following letter was then read by Mr. MARKHAM:—

"*To the Geographical Society of London.*

"GENTLEMEN, "Gondokoro, 20th October, 1874.

"I deem it a duty to communicate to your honourable Society the result of an Expedition confided to me by Colonel C. G. Gordon, C.B., of Her Majesty's Service, Governor-General of the Provinces of the Equator, to Uganda, the kingdom of M'tesa.

"Arrived in Gondokoro the 18th of April last, I received order from Colonel Gordon on the 21st to visit M'tesa, to present him gifts, and obtain information about his country. I started on the 24th April, with hastily collected *impedimenta*; myself armed with Reilly No. 8 Elephant, two soldiers, Saïd and Abdel, armed with Snyders, and two servants.

"The rainy season had commenced, and the difficulties of the route thus enhanced, a detachment of soldiers returning to their garrison at Fatiko, in their representations only added unfavourable auguries.

"Fifty-eight days of painful marches, and I arrived, weary and foot-sore, upon the hills of Uganda. The palace of the Great M'tesa faces me upon the brow of another hill, five hundred paces distant: the broad, well-swept roads; the mountains that lose themselves in the mist that conceals the Victoria N'yanza; the thickly populated banana-forests, from which ascends smoke from countless 'Zeerebaz,' were all in contrast to the flat, pestiferous marsh of Unyoro. The barbaric pomp and circumstance with which M'tesa received me as the 'Great M'Buguru' (White Prince) are details that to recount seduce me from my proper intention to give you information. You will pardon, however, a digression, when I tell you that my imposing presentation to M'tesa the following day was honoured by the decapitation of thirty of his subjects. What strange combinations are there not in the African character! M'tesa oftentimes showed me much feeling when I was seriously ill; and when permission was accorded me to visit the lake, and from thence to return viâ the Ripon Falls by river to Urondogani, in decapitating seven men—guardian spirits of the lake; and now M'tesa said to me in broken Arabic, 'It is necessary that I kill these men because you wish to go by the river (they would prevent you); they have done me much injury, but it pains my belly (heart) to kill them.' M'tesa is, say, thirty-five years of age, tall, and bears himself 'every inch a king.' *He shows a glimmer* of a higher intelligence than the *vulgus* *populus.* How reconcile, then, this common propensity to sacrifice his subjects, which places him upon the same level as Dahomey? I remained twenty-nine days as the guest of M'tesa; frequent visits were honoured by the decapitation of eight to ten on each occasion. Although thus honoured (?) I claim for M'tesa a higher intelligence than any other African prince; he has many qualities that distinguish him from his confrères. My horse, the only one ever seen in Uganda, was an object of the greatest wonder to M'tesa—wonder and fear to all M'Ugandi. Over difficult roads, and streams, and marshes, through which he swam rather than walked, I brought him back in good health; neither in Unyoro nor in Uganda does the redoubtable fly, 'Tsetse,' exist. Honoured as never stranger was before honoured, I sat upon a chair in the presence of M'tesa—a consideration which the M'Ugandi recognised in prostrating themselves before me. He called me brother, and I soon awakened in him the desire to be really the great King of Africa. Contrasting his *mesquin* royalty with that of a prince in the world without, by long stories of brilliant carriages and equipages, and all the paraphernalia of royalty, aided by photographs and pictures, he said to me, 'All that I have is yours, if you will build me a palace and give me a carriage.' I succeeded in gaining his consent to all my propositions.

"My projected return by the Victoria Nile (Somerset) was resisted by sorry means: 'Speke tried it and failed; the river is full of rocks, savage tribes, and certain death awaits you; the Grand Sultan will avenge your death upon me.' To all this I opposed an unalterable resolution, and, finally, he yielded a reluctant consent. The 14th July I visited the Victoria N'yanza. From the palace and Murchison Creek—three hours by a beautiful and romantic road—I arrived, and was met by a thousand of his warriors in canoes of bark of tree sewed together, ornamented by the head and antlers of the Tetel. The 'Magarrah' drum (accompanied by vocal imitations of the crow) and horns re-echoed by the surrounding hills. Down Murchison Creek and out upon the lake I was accompanied by this numerous escort. I measured its transparent depth, 25 to 35 feet. A cloudless sky disclosed me the opposite shore, 12 to 15 miles distant (?) to an unnautical eye. Deceived in this; more than double this distance it cannot be in width. The water is sweet. I visited the right shore (too ill to cross to the other), found no traces of shells. I had intended to pass from the lake viâ Ripon Falls to Urondogani. Superstition and fear of Afrites were too potent influence, and, notwithstanding my assurance that M'tesa had decapitated these devils, I was forced to abandon this project, and return to M'tesa; to whom again presenting my adieus, I left for Urondogani, the 19th July, where, after much suffering due to duplicity and hypocrisy (the Chief opposed me because I had closed the road to Zanzibar, and had received assurances of M'tesa that all ivory should pay to Gondokoro), I arrived, having consumed twenty days—a traject of only three or four days. Robbed of all my baggage and provisions, and deserted by my porters—the work of these miserable M'Tongolis. Speke has recounted all the miseries suffered on this same route. This was a painful rehearsal of what he suffered. M'tesa, as soon as he heard of it, offered to make me every amends. Ill from dysentery, weak and exhausted by fatigue, I replied, 'No, nothing; the river is my path homeward.' African diplomacy had done its best to deter me from my purpose to navigate the unknown river. I seized from the unwilling chiefs two canoes, and at last I was free from their devilish intrigues and daily annoyances. The 9th August, at dawn of day, having my two soldiers, two servants, and three children, I enforced presents from M'tesa, and folded my tent like the Arab, and silently stole away down the river, with scanty provisions, unknown to what fate. I had two brave soldiers with me. We rowed incessantly and together, though ill. On the 11th August, having on my right (say in lat. N. 1° 30′, or thereabouts) a high mountain, I entered a large basin or lake; the bed of the river here loses itself. Beset by storms and without compass, I was forty-eight hours struggling to find my way. This lake is at least 20 to 25 miles wide (wholly unable to perceive land from either side). Finally, the storm abating, I succeeded in again resuming my way. The 'gerch' here prevented my landing, though upon the floating turf-like gerch I succeeded in making a fire, and serving out to my half-starved suite and myself a meagre repast of flour and water.

"This lake seems the great reservoir, not alone of the waters of the Lake Victoria, but of the waters of the plateau, that great watershed extending southward, the real source of the Nile. Eternal rains (save in July and August) here have place, and from its almost immeasurable depth a lily with flat head seems to hold these waters in abeyance. Withered by the sun's rays, once a year they loosen their hold. Here perhaps is a demonstration of that still mysterious periodical inundation of the Nile. On the 17th I arrived near M'Rooli, where, attacked by 400 men of Kaba Rega in canoes, I defeated them after a fight lasting from midday till sunset, with a loss to them of 82 killed, of whom two were chiefs, causing them to desert their sinking boats. I received a wound in the face. I arrived at Foweira, near Karuma Falls, the 20th August; where, in a sad plight, suffering from want of food and swelled limbs from exposure and humidity, I was joyfully received by the adjutant of the garrison and by Rionga, whose delight evinced itself in dances. I had defeated his old enemy Kaba Rega.

"The river then from Karuma and Foweira to Urondogani is navigable even by the *Great Eastern*.

"Resuming my march northward the 15th September, I arrived at Gondokoro the 18th October.

"In Uganda I had induced M'tesa to close the road to Zanzibar, and, in the interest of Egypt's monopoly of ivory, to send his ivory to Gondokoro. I had explored the Victoria N'yanza, and in returning had navigated the unknown reputed unnavigable Nile to Foweira and Karuma Falls. Colonel Gordon will soon have a steamer upon the Albert N'yanza, and also one to go to Lake Victoria from Foweira.

"The country of Uganda is mountainous and picturesque, soil fertile, and impregnated with iron, crystal, and l'argile.

"Climate insalubrious and debilitating for Europeans. The valleys are cut by morass and marsh, the wallowing-ground of herds of elephant and buffalo. The jungle-fever is prevalent, and even the native is not proof against its deadly influence.

"Products: coffee grows wild; is chewed by the M'Ugandi; no decoction. Tobacco is largely cultivated, superior quality, and resembles 'Perigne' of Louisiana. Sugar-cane, Indian corn, sweet potatoes, yams, beans, pomegranate (only in the garden of M'tesa, but does not perfect), banana, and plantain of excellent quality; the whole country is a banana-forest.

"The population I estimate at half a million. The army has no organisation, consisting of say 50 soldiers, armed with guns of most ancient system. All M'gandi are armed with lance and shield. A General-in-Chief, called Kongowee, makes raids and despoils his own people. The character of the people is mild and child-like, superstitious and timid; in nowise warlike. The M'gandi works but little, or not at all; his pipe and merissa the haven of his happiness.

"M'tesa is absolute. He holds council every day; his M'tongoli on bended knees render their reports. He adjudicates only in serious cases, and his verdict is death. For serious offences a M'tongoli may cut off the ears. Since four years M'tesa has adopted the Moslem faith, introduced by some Zanzibar traders; the practice, however, is but little known. A few people may be seen with pieces of board, on which are inscribed, in Arabic characters, phrases of the Koran, the happy possessors of which are regarded with something akin to awe by their fellows. The origin of the race is obscure. The theory of Capt. Speke may or may not be valid. Arabic traders from time immemorial may have given a type to this people, a cross which certainly resembles the Abyssinian, and perhaps may have been produced by the Arab and the Negro. A large portion of the people are Negroes, black; but for characteristics of the Ugandi proper this is a field of speculation, and requires serious study.

"I ought to pay a tribute to His Highness the Khedivè of Egypt, who has recognised my services to my adopted country. A prince who places himself in the van of civilisation and progress, and who has chosen for the work my able chief, Colonel Gordon, requires no eulogy from me. I trust that the result may be the spread of order and enlightenment in Central Africa.

"I have the honour to be, gentlemen,
"Your humble and obedient servant,
"CHAS. CHAILLÉ LONG,
"Colonel, and Chief of the Staff to Colonel Gordon."

The CHAIRMAN said Colonel Long's was one of the most romantic and extraordinary stories of African travel he had ever heard. It was impossible not to admire the courage and determination with which Colonel Long had accomplished his arduous task. The paper afforded a very graphic idea of the perils and dangers that beset all African travellers, and should increase the admiration which was felt for those who willingly devoted themselves to such a work.

Mr. MARKHAM next read :—

1. *On the Country between Dar-es-Salam and Kilwa.* By Captain F. ELTON, Assistant Political Agent, Zanzibar.

[This is published entire in the 'Journal,' vol. xliv., pp. 238 *et seqq.*]

The CHAIRMAN said this was another chapter in the romantic history of exploration in Africa, and was filled with the same kind of perils and difficulties which had to be encountered in making any progress in discovery on that continent. Whoever went into those regions must carry his life in his hand, and have no ordinary powers of endurance. He regretted the absence of Sir Bartle Frere from the meeting. If he had been present, he would have been able to add valuable testimony to the interest of these explorations, which were all carrying out the great object for which he was despatched on the late mission to Zanzibar.

The following paper was then read by Major ERSKINE :—

2. *A Journey to Umzila, in South Eastern Africa.* By Mr. ST. VINCENT ERSKINE.

[ABRIDGMENT BY MAJOR ERSKINE.]

IT will be within the recollection of the President and many Members of the Society, that in the year 1868, Mr. St. Vincent Erskine, then a mere boy, explored the course of the Limpopo River, from its junction with the Lipalule or Elephant's River to its mouth, which was found at the Inhampura of the maps, and not as previously thought by many the Sabia, near Inhambane! This expedition was a most extraordinary one, considering that the difficulties overcome by a mere youth had baffled the attempt of many experienced travellers well supplied with goods, whilst Mr. Erskine had only a few beads, blankets, knives, and a little calico, supplied out of his savings as a junior officer in the service of the Government.

A paper on the subject, with copious notes from Mr. Erskine's Journal (printed by the Society), was prepared and read at a Meeting of the Society, in June, 1869, by Dr. Mann. The fact of the Limpopo debouching at the Inhampura was still doubted by some, although it had been frequently crossed by travellers and hunters, above the junction of the Elephant's River, where Mr. Erskine struck it; until Capt. Elton went down in a boat from the Tatè to that point. On this occasion Erskine found that the character of a trader would have been by far the best, as that of an explorer was not understood, and the savages, who had never before seen a white man, were much opposed to his passing, thinking that he would bring white people to conquer their country, as the Boers had done that near them. They had never heard of Natal, and called the Portuguese *red* men, some of whom they had seen, but these were half-castes. In the journal of his next expedition now before us, Mr. Erskine refers to this and to the concluding paragraph of his first journal, which says that the result of his examination of the vast country to the north-east of Natal, many times larger than England, is that many parts of it are healthy and fertile, and can hardly be said to be inhabited at all; and that it was extremely desirable that the country between the Limpopo and the Sabia should be explored, as a part of it is that described in old geography books as Sophala, or Sophira, or Sophir and Monomotapa (which last signifies in Zulu, "The children of the Mines)," and stated to be very rich in gold, several millions sterling having been exported thence by the Portuguese annually, and their having had cities there which were large and wealthy. The traveller, Carl Mauch, discovered remains of a city, called Zimbye, which he supposed to be those of the lost cities of the Queen of Sheba, on which these ruins are supposed to stand on the river Sabi (which is supposed by many to have been the proper name of Solomon's fair friend). By Mauch's account this must have been only 42 miles from the great Chief Umzila's kraal, which Mr. Erskine determined, by several observations of the stars, to be in lat. 20° 23′ S., and long. 32° 30′ E. Mr. Erskine, however, could hear nothing of the ruins, or of his friend Mauch. The original journal was unfortunately lost, with some of Mr. Erskine's instruments and all his observations, in a flooded river, together with a waggon, a white child, and five oxen; divers were employed to search for the journals, which were in a tin box, but in vain. The journal from which this paper is prepared has been written from memory, and from the notes of M. Dubois, who accompanied Mr. Erskine as interpreter, and who returned by sea with the ivory sent to the Natal Government by Umzila, and the heavy baggage. Such latitudes and longitudes as are given are partly from recollection, but mostly from his map, which he had on his person. Mr. Erskine tried to interest different friends in the exploration of the country between the Limpopo and the Zambezè, so as to make another expedition; but having failed to do so, had settled down at home in despair, when, in August 1870, a deputation or embassy from Umzila, King of Gosa, who rules from King George's River, at Delagoa Bay, to the Zambezè, arrived at Natal, apologizing for the ill-treatment Mr. Erskine had met with from his people on the Limpopo, and begging that he or some other person might be sent to establish friendly relations with them for trade and labour, and particularly that a ship with goods should be sent into the Limpopo, when he would "load it down" with ivory. Mr. Erskine had never ceased to regard the blank in the map north of the Limpopo as his property, and jumped at the opportunity when offered the mission by Lieutenant-Governor Keate, supplying a great portion of the goods required himself, the cost of which was afterwards paid by the Government. He sailed in a schooner in June, 1871, with Mr. Robert Dubois (who had come out of the terrible Limpopo Expedition with him before), as his interpreter, and one Natal "Induna," or headman (a Zulu), and a Zulu man as servant, who spoke English, and one of Umzila's men, who had remained behind from the embassy to accompany him. All his coin consisted of 6*s.* 6*d.*; goods being the only coin current where he was going, and he left his young bride and all his relations, to face again the horrors of a journey on foot through the wilds of Africa, from which he had only recently escaped barely with his life. At his arrival at Lorenço Marques or Delagoa Bay, which he describes very minutely as a miserable place, owing to misgovernment and want of energy on the part of the Government and the inhabitants, who were all half-castes, he found the Governor hostile to his expedition, because hostile to the Chief Umzila, with whom his Government had been recently at war, and he therefore refused him permission to go into the interior, although he had a passport from the Portuguese Consul in Natal, marked for the interior, and letters from the Natal Government stating the object of his visit. Mr. Erskine, however, was not to be stopped in this way; he landed the bulk of his goods under Mr. Dubois, as they had paid duty, and arranged with him a rendezvous on the Limpopo, proceeding himself to Inhambanè, a Portuguese settlement higher up the coast, where the Governor, thanks to M. Laforte, a French gentleman, all powerful there, allowed him to proceed into the interior. The Bay of Inhambanè is surrounded by a belt of coco-nut trees, which grow luxuriantly, and which if properly utilized would produce an immense return. Mr. Erskine states that the Portuguese there since the Zulu invasion are neither feared nor respected, and that, having only negro troops, they are held in contempt by the surrounding tribes. The productions are ground nuts in immense quantities; sugar, coco-nuts, india-rubber, and gum copal. They make the roofs here very ingeniously by forming a thatch mat on the ground, instead of thatching in the usual manner, and then put the thatch mat on the roof, and the walls are made in the same way. The abolition of the slave-trade has depopulated Inhambanè and Delagoa Bay; but legitimate trade is fast restoring prosperity to both. M. Laforte, who is the tutelary genius of Inhambanè, and but for whose energy and military prowess the Portuguese at Inhambanè would have probably been driven into the sea, or confined to their so-called fort, was extremely kind to Mr. Erskine. On the 31st of July he started for the interior, and marched 6 miles to a Kraal, where he was well entertained with his party, which consisted of 12 porters, 6 of whom carried the pieces of his double boat, made of canvas and framework by himself. The huts of the Tongas are kept purposely surrounded by dense bush, in order to allow of their escape into it when attacked, and they are consequently more picturesque and agreeable than those of the Zulus, which are in the open. A long straight avenue leads up to them, with impenetrable bush on each side, so that the approach of an enemy must be seen. In the very limited part where life and property are secure, the Tongas, Mr. Erskine says, "plant coco-nuts, palms, and lemons," the two latter the planter may hope to enjoy, but the coco-nut trees he evidently plants for posterity, as they take some thirty years to grow, though some are said to bear in seven. Altogether the Tongas are an improvable and improving race, they consider war an abnormal state of existence, and to be avoided as much as possible. Differently from the mere savage Zulu, who regards it as the only fitting state of life, and despises the arts of peace. Whether the Tongas are Chobis, Basiga, Bila, Kulu, Mandauda, or Mandoua, or whether they are under Zulu oppression or Portuguese protection, they are one and all industrious and capable of improvement, possessing great agricultural abilities, and many rude attempts at manufactures! Objecting to military discipline, and preferring to be governed by petty chiefs, whom they obey more from moral influence than from force. The knives with ornamented ivory handles and sheaths, the blankets made of the bark of trees, by felting, those woven from the same bark, and many other objects of art brought out by Mr. Erskine, confirm in a remarkable degree what is here stated; the Zulus never having attempted anything of the sort though living in a colder country, and where skins are far more scarce, and although the fibres in the Zulu country are of very superior quality. As a further proof: "Passing through a beautiful country alive with francolines, partridges, Guinea-fowl, and singing birds of various sorts, he says. About 10 o'clock I reached the kraal of a principal man, and was entertained for the first time by the really effective music of these Basique, four or five native pianos or rather harmonicons were produced, and several drums, large and small, with rattles containing the seeds of the Kaffir boom enclosed in reed cases, also other calabash rattles fixed on handles of a peculiar kind, fastened above the calf and ankle of the right leg. The pianos started the tune, which formed a sort of accompaniment to the singing or air, the little drums had their part, and the big drums theirs, the rattles of one sort, and the leg-rattles also took separate parts. Instruments of one kind were played in conjunction with each other, each in their turns and at intervals, as it was deemed necessary, a clash of the whole came in a chorus together. The effect was good. At times it died away almost to silence, and then gradually grew louder as each instrument chimed in, till the big drums, hand-rattles, leg-rattles, bass voices and chorus came to the final *crescendo*, and then as gradually died away again. I never heard the native music again so effective, partly because on our return the men were absent in a warlike expedition. After being thus entertained, I presented the headman with some beads and went on." They still passed through the bush, and, excepting on occasional rises of the land, seldom caught a view a-head. Proceeding through a country principally of deciduous thornless trees, with occasional umkoshle, and a sort of gutta percha, and sleeping in the open; he found plenty of water always at the huts, proceeding apparently from the Inyantombè River. The country was so flat that he attempted to get an observation for variation of the compass by amplitude. It gave 210° w. The instrument he had, having lost his pocket compass, was a *multum in parvo* sort of compass, by Casella, sent by the Society, which he did not find so effective as an ordinary prismatic compass, which he could not procure in Natal, though some were afterwards sent to him. The barometric readings were lost with his journals. On the 2nd of August Mr. Erskine reached Umzila's Border, at the Inyantombè River, an affluent of the Inyanbone, which he also crossed, flowing northerly in lat. 23° 55′, where he saw a creeper, which he describes as the original of Jack's bean-stalk, and which not only covered the tops of the trees like an umbrella, but also several bushes, and it was further supported by poles, until it covered 5400 square feet. Pods, the size of small boys' heads, hung in masses from it, striped with broad bands of white and green, containing flat nuts the size of a florin, rich in oil, and eaten by the natives; these nuts were planted in Natal, and one grew well; it has not yet borne fruit. Another peculiar tree, called Umtonte, was found unaccompanied by any other forest tree. It was deciduous, and apparently belonged to the leguminous order. It bears a pod with brown bean-shaped seeds, and the country is covered with it, and it is frequently so completely covered by lichens as to resemble elfin groves. In these sandy wastes no game is found, and even birds are never seen. It was thinly populated.

This was the character of the bulk of the country from Inhambanè to the Limpopo. The elevations were mere undulations, and had evidently been formed on a sea-beach by the action of the water, sometimes of mere sand, and at others from arenaceous soil of a red and more fertile description. They are universally covered by deciduous thornless trees, with but little grass, and that of a poor sort. There is no undergrowth. Patches of vegetable ivory palm fill occasionally desiccated lagoons. The party crossed the Eshegibi stream, which disappeared in a large open flat which had no visible outlet. The district of Inyansuna was now crossed. Several interesting spots required further investigation, especially the mouth of the Inbabali or Zavora River, and the mountainous region between Umzila's Kraal and the Zambesé, including the auriferous region of the Manika River. The idea occurred that as the litmus dye is produced from a tree lichen (the *orchilla*), perhaps the moss-like lichen, so profuse, might be utilised, though it is not strong enough for cordage. The natives' huts are always miles away from water, showing the great insecurity of life and property, and their clearings are at intervals along many rivulets and streams. Hippopotami abound. Next morning they came on the Inyampahimpale, or Sable Antelope River, a strong and rapid river, about 100 feet wide. How all these rivers rise far in the interior in a flat country, and fed apparently by only periodical mountain streams, is a puzzle. Any geographer traversing that country would do good service by tracing these rivers to their source. On the ninth day he came to a chief, called Umveomus, who spoke Zulu, and when he heard that Erskine was going to Umzila's on a mission he said it was good. "And is it true that the British Government is going to take the country? That will be good; there will be no more running into the bush to avoid the asegai." He was sorry to have to disabuse him of the idea, and said he was come to arrange for the people to go and to come from Natal to labour and trade in safety. He said that was good; but that the English must take the country, as their Zulu masters took from them whatever they had a fancy for. He asked him why they did not like the Portuguese? to which he replied, that they shut themselves up in their walled towns and did not govern; but they wanted powerful white chiefs to live among them, strong to punish and reward, and who could protect themselves and their subjects. Passing a whole day without finding water, he came to a dense bush, also without water, where he first saw on this route the Tsetse fly and black-crested guinea-fowl. The next day he almost came to bloodshed. Passing a kraal, where the people were drunk, they rushed on his men and almost threw them down in taking the things off their heads. They said the white men must stay with them and give them presents. The next day Mr. Erskine refused to do either, and ordered his men to shoulder their loads. They begged him not to enrage these men, as they were drunk. As they stopped his men, he went on, and when they sent a man after him he told them that he was Umzila's guest and that the things were his, and they had saved him the trouble of carrying them. He had previously intended to shoot one man; but they saw that he was determined to do so, and let him pass. Next day he reached the confluence of the Shohozoli, a large river, with the Limpopo, where the bellowing of the hippopotami was constantly heard. This must have been an interesting moment when, calling to mind the desperate circumstances under which he had last seen the Limpopo, alone, fever-stricken and with only a small piece of brass-wire left, with which to make his way back for many hundreds of miles. The valley was densely peopled when he was there in 1868, but now it was still more filled up. Next day he reached Manjobos—his old enemy, Manjobo, commander-in-chief at the Bigin. Mr. Erskine sent to say that "Maskin" had arrived for the second time, and would like to see him soon. He came that night, but did not see him till morning, and then said he knew nothing of him, his mission, or of Mr. Dubois and the goods. He admitted next day that he knew of the expedition, but said he had nothing to do with it, and if it were true that Umzila wanted to be friends with the white men, he did not. He gave a goat, and wanted all he saw. Leaving on the 15th of August, he found plenty of inhabitants on the Limpopo for some distance, when the population became thinner.

The next day he met Mr. Dubois and his goods. Mr. Dubois had had a terrible time of it from want of bearers, and the troublesome navigation in canoes of the King George's River for about 70 miles. It is only about 8 miles from the sea. Though shallow at the mouth, the river appears to be deep elsewhere; hippopotami abounded, and the country was so infested with bugs and rats, that he could not sleep at night. The main stream bursts through the Bomba mountains and rises near Leydenburg; its chief affluents are the Salibala, on the upper waters of which are the new Gold Fields, the Umgerania, and the Umlumase. The King George's River is not more than 100 yards wide. All these rivers rise near Leydenburg, at about an altitude of 6000 feet, in one of the finest and healthiest countries in the world. The coast lands drained by them are fertile, but the climate is too unhealthy for European occupation; therefore except for depôts for goods, or for sugar or tropical produce, they will never be valuable. A small steamer from Lorenço Marques, well supported, would find ample employment here. They now started back to Monjobos, finding the Limpopo quite unnavigable, and on arrival there spent some time in putting together his double canvas canoe and making inquiries about his route; and he then records, for the first time, that the whole country, from the Limpopo due north to the Zambesi was one dense bush-covered plain. He drank milk and ate green maize, which is found all the year round, and had no fever; whilst Mr. Dubois, who feared both, suffered much from it. Although guests of the King, they were obliged to buy food, which they told Manjobo was an insult. The soil further in was very superior, but not occupied. They visited the Royal Military Kraal at the Byin, a very pretentious place, which might hold from 1000 to 2000 cattle, but did not usually contain more than 100. Here they were hospitably entertained. Fish of various kinds abound in the Limpopo: one kind, weighing from 5 lbs. to 20 lbs., was very beautiful, and a drawing of it was preserved; it has eight teeth above and ten below on the *outside* of the mouth, with channels cut to receive them. The river is also alive with aquatic birds, which are described. They now started down the Limpopo in the double canoe, described in Baines' and Lord's books, which Mr. Erskine had made under Baines' personal advice, and drawings. On the whole, he prefers the skeleton of a common wherry, to be covered with canvas. They found the river so shallow that, *although their craft* drew only a few inches, they frequently ran aground. The natives were much surprised at seeing a sailing-boat, and followed for miles, exclaiming, "There go the fathers of ships! there go aquatic birds! there go fish! there go the children of the sea!" On the fourth day they met with a sad mishap: when crossing a wide reach in a breeze the boat took in water at the junction of the deck and canvas, and, not landing soon enough to bale out, she went down. Mr. Dubois jumped overboard with his gun, but was compelled to drop it. Mr. Erskine collected his instruments and swam to the shore with them. They lost two valuable rifles, their boots and pots, &c., which were there worth anything. Mr. Erskine dived that day and the next until quite benumbed and severely cut with coral-rock, but could not recover anything but the boat, which was uninjured; but the Kafirs afterwards broke her in landing, so that it was not worth while to repair her, and her skeleton was left in a tree as a trophy. They now went down the river in a dug-out. They were three days going down to the sea from Manjobos, and the river was only navigable for about 60 miles apparently. Here Mr. Erskine was attacked by fever, which had been hanging about him ever since his exposure in diving for his things, and his description is most graphic. He says, "I could have died with words of gratitude to anyone who gave me strychnine."

Mr. Erskine describes most minutely the entrance to the Limpopo, with instructions to vessels entering it. There is a double bar there, and the tortuous channels are always open. He had no boat with which to explore these channels, but thinks they must be from four to five fathoms deep, and the same inside for 60 miles. It is altogether a more navigable river than either the King George's or Mapoota rivers at Delagoa Bay. The latitude, as determined by Mr. Erskine from the natural horizon, in 1868, was south 25° 15′; but the mist from the surf doubtless affected the result. Captain Owen's determination was 25° 11′ 6″, a difference of 3 to 4 miles. On this occasion, the mean of several stellar and solar observations almost exactly agreed with that celebrated surveyor's determination, namely, lat. 25° 12′ s.; the longitude was 33° 45′ E., disagreeing with Captain Owen's chronometric observations by 14′, his being 33° 31′ E. The width at the mouth was 13¼ fathoms at high tide. The natives said that the mast of a vessel and an anchor was to be seen on the bar a few years since, exactly agreeing with Admiral Sir William Hall's account given at the reading of the paper, in 1868, even to the vessel sticking on both bars, but with the exception of the crew being eaten by natives—but they said that might have happened, as the Chobis were cannibals then.

He sums up the navigation and commerce of the Limpopo thus:

"It is difficult of entry; has 60 miles of navigation, 25 of which are directly inland; and it flows through a fine alluvial valley 15 miles broad. Its productions are hides, horns, native furs, gums (including copal, he believes), ground-nuts, vegetable ivory, orchilla lichen, mangrove poles, perhaps a little cotton (which grows wild and is used by the natives), honey, and bees-wax. Its advantages of position are its proximity to Leydenburg, in the Transvaal country, where bread-stuffs are grown, as well as wool; and which is also rich in minerals of all sorts: the distance to the new Gold Fields being 170 miles.

"There seems to be no doubt that, with a tug-steamer, the port would be extremely valuable, and it should be surveyed at once by the Admiralty; indeed, I understood that the survey which was recently made of the coast and rivers from the Cape to Natal was to be continued at once on this coast. It is truly strange, that in the nineteenth century, with so many vessels as we have had on that coast, suppressing the slave-trade, it should be virtually unsurveyed; and that we should be dependent on a land traveller for information as to the mouths, navigation, &c., of numerous large rivers such as those mentioned in this Journal—the Limpopo, Sabi, Bosi, &c.

"The disadvantage of the Limpopo is the fever, which prevails there and all along that coast beyond 27° of lat., but which does not extend beyond the foot of the hills which run, more or less, near to the sea, and the vast plateaux of which are as healthy as Madeira."

As a specimen of Kaffir delays and lies take this: "Manjobo (his *bête noir*) persisted that he could not get bearers, and added that war, not goods, was his business; and, when Mr. Erskine threatened to leave the goods behind, he asked when he would be ready, and was told the day after to-morrow. The next day he produced bearers, and as Mr. Erskine was not ready, he said it was Sunday. He said he had been to Delagoa Bay, and knew that day, when everyone howled as if he had the stomach-ache, and made holiday for three days. He then said, as they had come into the country to make peace, he was bitten by the same mania, and was going to make peace between two Chobis by force; and just then a force of warriors passed. He gave some more insolence, and left, and they saw no more of him, the viceroy of the king's southern dominion and forces—a ragged lot of Tongas and mongrel Zulus, with a Tonga commander-in chief, five-feet nothing when his feet are well dusted. Here they saw a refugee chief from near Delagoa Bay, whose father was the chief of Inyak, the British isle there—now under arbitration by Marshal MacMahon. He had run away to avoid the fate of all Nozængili's relations about there, he having killed this man's aunt and father, several uncles, cousins, and influential men. He told us of the seizure of the *William Shaw* in the English river Mapoota, and said we were 'all talk;' that we called Inyak ours, and it was Nozingili's, or else he could not kill the people there; and said, 'Why do you let the Portuguese seize your ships?' The natives knew all about the road being made from Delagoa Bay to the Dutch Republic. They left the goods at Manjobo's, as no bearers appeared; but, finding this, Manjobo sent them after them, carried by his own wives, who abused them roundly. In the art of vituperation the Kaffir women are proficient, and might excite the envy of the white world. This was a ruse of Manjobo's to excuse himself to the king for having delayed the goods."

Here he met with a most graceful and gigantic palm called Muli, from the stream on which they grow. They would adorn any large conservatory. These large, stiff-leaved endogens send up brilliant orange stems 50 and 60 feet high. The country was fertile here, and the Chobis industrious—having large clearings of bananas and other fruits.

They now had attacks of fever every fifteen days, and had to lay up each time for two or three days. Calomel, Dover's powder, emetics, and quinine, always proved effectual. Each of them had the fever about thirty times during this journey.

Here they saw the first leper, who had lost some of his joints, and had the usual leonine expression. They always found lepers in country where the water was bad.

Many indiarubber vines were seen, but mostly tapped. It is the same as that on the West Coast. After eleven days' travelling, they were only 24 miles from Manjobo's, showing what travelling with royal bearers is, marching in all directions; and so they went on. Here they picked up an amphibious tortoise, who bit very strongly with a movable flange of the lower part of its shell, which was black.

The Chobis had curious bark canoes, and used double paddles like ours. They are a fine race, lighter than the Tongas or Zulus, and with finer cut features. The men are frightfully disfigured by knobs down their foreheads, &c.; and the women are adorned, we are bound to say, with panniers made of bark.

Here they saw some tree aloes, about 40 feet high, and very like dragon trees. They have here numbers of domesticated bees in their huts, who don't *seem* hasty or ill-tempered with their stings:

pleasant companions! The people here consume numbers of dried caterpillars, which are thought a great luxury.

The large river here is called the Inyarhimè, and is navigable for a great distance, but it is not known whether it is so at its mouth. There is a fine opening here for a white trader. This river is the Lavora or Oro of the charts. These Chobis work well in wood iron, and are a most interesting race, living on manioc or cassava. Their government is a Commonwealth; each stockade being a separate realm. Having no leader, they cannot act on the offensive, and only combine for defence. Mr. Erskine thinks it likely that some ancient ruins may exist near this, at a peculiar bluff on the Saguti River, called Shimbuta, where their kings were buried.

The goods not arriving, messengers were sent, who said the carriers had been attacked and three killed. A company of warriors were sent to escort them in. They were fine men, dressed with a necklet of blue wildebeests' tails like a short cloak, and the same on the arms and legs. The travellers now arrived again at Maxisi, Mr. Laforte's country house, near Inhambanè; all this trouble, expense, delay, and suffering, having been caused by the ignorance and barbarity of the Portuguese Governor at Lorenço Marques, conduct which was subsequently reproved by the Governor-General at Mozambique, who said that Erskine's objects were perfectly legitimate and should have been encouraged. The usual delays now occurred about bearers after starting, and they had to seize and carry away with them all the goats of a chief to compel him to produce bearers, although the country was densely inhabited.

Mr. Erskine next describes the coast from Durban to St. Lucia Bay, or the Zulu country, as having a high ridge near the sea, backed by hills rising step by step, but from thence northward towards the Zambezi; the bush country is a sandy flat covered with bush, the mountains lying far away until at the Limpopo, where they are 200 miles inland. As a rule this plain may be described as a mitigated desert. The great limestone plain of South Africa is hemmed in by mountains to the west, and it extends, by the accounts of travellers, as far as Abyssinia. The maps of this coast are entirely wrong, with many mythical mountains and streams ornamental, thus showing the necessity for an Admiralty survey of the coast. The country here is called the Dibin. Mr. Erskine explains the paucity of names of the district through which he passed by the loss of his journal.

He now came to quite a different race, whose huts were of bark. These people drew their snuff up into their noses by long bones, and wore *tails or stumps sticking* out behind, made of leather ornamented with brass. Here he overtook Mr. Dubois (whom he had sent on) nearly dead with fever, and if he had not arrived with a supply of quinine he would have died. The natives here caught game on foot, when their feet were cracked, they said, but more probably because they were clogged by running over soft clay. Mr. Dubois having caught game thus on foot.

The whole district was disturbed, because the Zulu Governor was in it with 200 hungry Zulus, running about plundering the Tongas. The only kraal that had a goat was that they were in, and that only because when a Zulu came to demand goats and fowls Mr. Erskine told him to be off or he would thrash him. He went also to the Governor and accused him of stopping his journey by disturbing the district, but was appeased by a goat and smooth words. For several days they had to drink putrid water out of the trees or smoky off the thatch, the huts being built many miles away from water in order to avoid persecution from the Zulus, the curse of this country for hundreds of miles.

Here he came on the Gabulu River, called by the Portuguese Gavura, a large river in lat. 22° 16′. Several mythical streams are laid down here on the maps, which are all, no doubt, the Gabulu, which runs parallel to the sea, and has been touched at by traders. It runs into a bay called Masomone, north of Bazaruta Island. The natives here are Bushmen, and great hunters. They kill elephants by making holes the size of their feet, with a stake loosely fixed at the bottom, which runs into the wretched animal's foot and remains there, preventing his moving, until they shoot him with poisoned arrows.

A superior race must have lived here once, as deep limestone wells exist far beyond the powers of the present race to dig, who probably inherited their knowledge of handicraft from them.

The natives here described some immense caves near, which they were too hurried and disheartened and sick to visit. They said the caves were insupportably hot and required light to visit them, and that there was a stream and pools in them. Lat. 21° 43′, long. 34° 34′. Here also they had to go 24 hours without water, with a long march, and the thermometer at 108° in the shade.

Next day they overtook Messrs. Beningfield and Skillbeck, who were shooting elephants, and found them in good health, and enjoying themselves *greatly*. As they wanted rest, they staid with them some days, till they left for home at the end of March. The mornings now became so cold that they had to sleep on blankets and wear coats.

They next reached the Sabi, which was inhabited by the dominant

Umgonis, who had fowls and other food, and who rob the poor Tongas of everything. The bed of the Sabi was 1000 feet wide, but the stream (then the dry season) only 100 feet, and 4 feet deep. They came here upon a kind host, who gave them a sheep, and offered Mr. Erskine a tusk of ivory and his daughter to wife; both of which were politely declined. Here, for the first time, their coffee was ground between stones, wooden troughs, from want of stones, having been previously used.

Here also they found women carrying about leathern dolls like children, in the hope that it would create maternal feelings which would lead to their having children. These dolls, which (I have seen) are very artistic, and have hair of strings and chignons of red clay, like those worn by the women there and others not so far south. They have eyes of black beads, with small red beads for pupils. He was much distressed here to see the state of the little slave children (waiting, no doubt, to be sold to the dealers), which he describes thus:—"We saw three or four poor little Kafirs and a lot of dogs lying in the ashes—whitened by the ashes—an indistinguishable mass of flesh, or rather *bones*. They give these poor slaves *no* food. If there are any pot scrapings they get them; if not, they have only such rats and birds as they can catch."

In Mr. Dubois' 'Journal' is the following:—

"It would be a mercy to buy them if the law would allow it; but humanity (?) forbids it: it would be slavery, and that cannot be allowed—no, not even to save their lives." A plan for effecting this was sent to England some time since, but met with no approval.

Here they crossed the Sabi in lat. 21° 18′: it is quite unnavigable, though its bed is a mile broad. The country was well inhabited. They now came on a large river called the Gerongosi and its affluents, laid down in the most recent maps (Dr. Petermann's) as running into the sea at about lat. s. 20° 28′, at Sofala; it is nine miles south of that place. It is navigable for some distance, but no trade is carried on, owing to the Portuguese being afraid of the Umgonis. It drains the plains between the Bosi and Sabi Rivers, about 6000 square miles of poor sandy bush. Game, elephants, and hippopotami are plentiful.

At Tibel's kraal they saw cotton-cloth made of an indigenous plant growing wild of three sorts; one, the cotton of commerce; another, a creeper; and a third a small tree—all having the true leaf and flower of the cotton-plant. The primitive process of weaving is described. They make only their own cloths, narrow strips.

Here they came on a district of dense bush filled with untapped indiarubber-creepers. This place is remarkable for the swarms of ants and the numbers of leopards, the women being afraid to work alone even in the daytime on account of them, and the doors of the huts being made of strong wood in consequence. One ran off with a fowl as they were starting. They suffered constantly here from fever, and could not sleep for the rats.

They now passed through a dense bush, and then came to a fine forest, beyond which lay the largest kraal of Umzila's. There they found, as Erskine had predicted, rain and fine crops. They crossed the affluents of the great Bosi River. The path here was 1500 feet above the sea.

The view from the western slope was the finest he had seen, and is thus described :—" Due west the valley seemed to open out into the plain, and nought but the horizon was seen. To the north abrupt, wooded mountains capping each other, until closed in by the grass-clad Sipumgambile, with its cap of timber. To the east the ridges appeared to end abruptly in a densely-wooded cañon, which debouched into the Bosi, whose abrupt wooded banks seem to close the view. Beneath, the valley of the Umswelesi lay rolled, and flat as a picture, with its meandering waters fringed with evergreen trees, and it looked smiling and peaceful in its chequered frame." This valley is destined one day to be one of the most productive spots on that side of the continent. It would grow sugar and coffee admirably; and, being 800 feet over the sea, is quite healthy. It is only 125 miles from Inhambanè, and there may be ports on the rivers much nearer, which shows again the necessity for an Admiralty survey of this coast.

Having arrived near to Umzila's kraal, they sent to announce their arrival, when he replied that they were to stop where they were. Having waited a fortnight, they sent to say that unless placed nearer to him they should return home, as they were being starved there. They were, at last, allowed to come to his kraal at the sources of the Umswelisi, and called Tsamatskama or Nodwengu; Tsamatskama being its ancient Tonga name, and the latter a Zulu name, imitated from the name of the kraal of Umpanda, King of the Zulus. They halted within 500 yards of the King's kraal on the 8th of April, 1872, having started from Natal on the 25th of June, 1871; all those months having being wasted chiefly by the ignorant opposition of the Portuguese Governor at Delagoa Bay, and the rest by the want of bearers, owing to the disobedience of the tribes supposed to be under Umzila. In the afternoon a lot of drunken councillors gave Erskine two goats and much insolence, saying the King could not see them until his messenger arrived with the goods. They asked where they were to sleep, but got no answer, and had to sleep under the canopy of heaven. Next day a messenger arrived, saying they must return to the kraals on the Talè. This Erskine flatly refused to do, and all the other kraals being royal, they were not allowed to go to them; and, at last, Tongas were sent to them, and they were told to build huts wherever they liked, as long as they did not overlook the "Palace"!! This they did, and, after two months and a half of waiting, they moved close to the King's kraal!

The latitude of Umzila's kraal is S. lat. 20° 23′; long., by dead reckoning, E. 32° 30′; elevation, by barometer and boiling-point, 3200 feet above the sea.

Here follows a full and most interesting description of the native races about there; the different kings, their wars, &c., and of a *rara avis* of justice and clemency, who conquered the whole country, confined the Portuguese within their walls, but eventually went back to his mountain home, and allowed the tyrant Manukusa to rule the country. This man heard that the Boers of the South African or Transvaal Republic were seeking the sea at the mouth of the Limpopo. He collected an army, and sent it to intercept them. There were but twenty-seven families in all.

They fell on the Boers at a little stream that enters the Limpopo near Erskine's "meeting of the waters," where he struck the Limpopo the first time. The Boers were defeated, and many women and children killed, and waggons and oxen taken. Some Boers managed to escape with their waggons; some few reached Delagoa Bay, and the rest died of the fever, of the treatment of which they were ignorant, even up to quite recently. Many of them were down with the fever when they were attacked.

The natives show a baobab-tree, where one of the two brave Boer leaders fell, fighting, side by side with their backs to the tree, with their men, and repulsing attack after attack. The other leader, whom they called Muhas, escaped. Two men only reached Delagoa Bay.

Manukusa now attacked his old conqueror, Naba, and, owing to mutiny in his camp, defeated him, and drove him into the Matabelé country (Moselikatze's as we call it). He defeated and routed the Portuguese in many engagements. Eventually he was driven out by Umzila, with the assistance of the Portuguese. Manukusa paid a tribute of 300 head of cattle annually to the Boers, but Umzila both hates and fears them, and robs and ill-treats them *on every opportunity*. The Portuguese he neither fears nor hates, but regards them as appendages to his empire, to fetch and carry goods for him, in fact, as a sort of enlightened Tongas. He robs them when he likes, and when goods and powder become scarce he proclaims peace. If the Government was to stop all powder and caps from going into his country, he would soon be brought to reason, but the enormous gains of the trade are such that neither they nor the Cape Colony can resist the temptation, though warned of the consequences by the Government of Natal, and by the Boer Republics. Nothing but a Sicilian Vespers will bring these lotus-eaters to their senses. Umzila's chief complaint was, that the Natal Government had not sent him the guns he asked for, and powder, although it was explained to him that we could not arm him against the Portuguese, with whom we were on friendly terms, and this although they themselves sell guns to the natives in any numbers.

Long weeks were now passed in idleness, as sport was not possible, on account of the grass which was high overhead, and the buffaloes formerly wounded being dangerous. Umzila sent a cow now and then, and they got some fowls, honey, Kafir corn, and sometimes shot a buffalo, and the lions provided one; and, fortunately, one of the Queens died, and the "funeral cold baked meats" "furnished forth a feast." Nothing but howling, eating, and drinking was done for a *month*. To pass the time they made an excursion to the Tongo mountains without guides, as they could get none; breaking their way through the tall grass, and then following buffalo paths. There Mr. Erskine found a splendid site for a township. They heard here some vague rumours of ruins, but the moment inquiries were made, the narrators "shut up," being aware that they were on forbidden ground. Mr. Erskine thinks there can be but little doubt that ancient Mahomedan ruins exist between this and the Gorongosi of the old Monomotapa (or Children of the Mines) people.

Being in an official character, he thought it best not to create suspicions at *that* time by inquiries, hoping to do so at some more favourable opportunity. He found here the kraal of Imbbongan, the Zulu Governor of the district, and the terror of the Portuguese. He gave him nothing to eat and a hunter's shanty to sleep in; and coming to see the Englishman in the morning, he found him with an empty stomach and a mouth full of all the Zulu abuse he could muster, and, spitting on the ground (a great insult), Mr. Erskine marched on, the savage calling after him, "There are a few hippopotami in the Lusiti; they are my cattle, you must not shoot them." *Mr. Erskine called* back: "I'll shoot every one I can." The kraal is situated in the most beautiful spot Mr. Erskine had ever seen.

To say that this piece of country is full of interest is but expressing a tame opinion of its geographical and geological features. This basin of mountains is the source of the great Bosi, one of the most interesting problems of geography. By its exploration, a knowledge would be obtained of vast regions of healthy country closely adjoining the Port of Sofala, and if taken in hand by Portugal and offered to emigrants on a liberal scale, it would immediately solve for ever the native difficulty in Southern Mozambique, and form a source of wealth and commercial activity such as she has not known since the days of those heroes who gained for her a grand colonial empire, of which the fragment alone remains to her now.

He slept at the foot of the great Shinanimane mountain, which rises from the plain 3200 feet in a sheer wall on the Elarone River, in lat. 19° 50′. This can be marked as his furthest point in 1872. He found his friend's cattle, the sea-cows, and had a fine shot at 20 yards at one, but did not bag any. He made Umzila's easily in four days from this magnificent and valuable country. The distances in a bee-line from Umzila's kraal are from

	Miles.		Miles.
Leydenberg	345	Chiluwane Isle	140
Zoutpansberg	174	Zofulu	125
Matabelè's Kraal	180	Quillimanè	300
Cape Town	1190	Senna	250
Dúrban	580	Tete	260
Delagoa Bay	335	Lake Ngami	680
Inhambanè	250		

Domestic animals perish in the plains from some mysterious cause. Mr. Erskine does not believe anywhere from the Tsetse fly. Donkeys less so than others. Elephants and camels have not been tried. The low country is healthy during July, August, September, and October, so that in these months European forces could traverse them. He closes his account of this tempting country thus:

"In fact a country more adapted for easy conquest by Europeans could scarcely be found, and when once on the high plateau, a climate superior to that of Europe prevails. The country can also be entered with transport animals from the back or west side, traversing Umziligazi's country. A letter he wrote to a friend, and which was published in the "Mozambique Notice" clearly showed how easily Portugal might acquire this splendid country, and bring prosperity to her possessions here. To occupy it in the usual way for trade purposes alone would be useless, as they would have to keep up an expensive garrison, but to offer the land to immigrants for settlements would not only do away with the necessity for troops in the long run, but settle the native question for ever. Compare the difference between the progress of Natal and these colonies, and it seems marvellous. The secret of the success of the former lies in a nutshell; and that nutshell is land grants and immigration. Without these Portuguese rule will ultimately be obliterated from the country south of the Zambezi: and their place be taken by the Anglo-African states of the south. If the Government have not the money or the energy to take the matter in hand, there are many capitalists in Europe able and willing to close for the concession of land and some share in the vast mineral wealth lying hidden in the soil. A little gold is still exported, and it was at one time sent out in large quantities from this district."

Mr. Erskine describes minutely Umzila's army, its enlistment, discipline, and the ceremonies and incantations when proceeding on service, in order to render it invulnerable by the witch doctors; also the speeches of the chiefs and the king. They are a wretched lot of ragamuffins in comparision with the Zulus, an army of whom is an imposing sight. An army of 2000 men was despatched one day, to whom *fifty guns* only were issued with six rounds, and Umzila told them not to *waste their ammunition* or game. This shows what nonsense it is to talk of the *impossibility* of keeping ammunition out of the hands of the natives. The king closed this review by getting royally drunk, and chasing his sons about with a stick, and finally setting fire to their huts and burning their things. The sacrifices as usual with these races were to the spirits of their forefathers and not to any God. An earthquake passed here on the 18th July at 8.37 A.M. from north-west to south-east. The ground did not shake much, but there was a loud rumbling noise, it lasted three minutes; next morning, at 4.41, there was another shock. Umzila asked whether they caused it, and Mr. Erskine replied he knew no more about it than he did, though tempted to say it was the grumbling of our Government. At last Umzila sent down a paltry lot of ivory, eleven tusks, and said they were to pick up twenty more on the road. He told him it was perfectly ridiculous, that he had sent to say that he had a shipload of ivory for the Government, but that the Government did not cry for ivory, but that if he gave him only one tusk, he would take it and go, but that the Government would judge of him by his acts.

This put them in a terrible rage, and they abused them all round. He says it would be wearisome to detail "all their ridiculous behaviour." At length it was arranged that Mr. Dubois should pass out *viâ* Inyambanè by sea, with the ivory, and Mr. Erskine by Leydenburg instead of Zoutpansberg as he had wished, on account of the scarcity of water on the latter route. They started on the 30th of July for home. The journal of this route was lost with the rest of the journal in the waggon which was washed away in Natal, and not having Mr. Dubois' notes to refer to, the journal is all from memory; but the map as laid down daily was preserved on his person, and is now here; it is on the scale of 8 miles to the inch.

Arriving at a kraal, they were so tormented by the Tsetse fly that they could not sleep, nevertheless there were many dogs, who are generally supposed to be the first victims to it. They had been bred there. He purchased one as a curiosity, and to confirm his opinion that the death of the animals in these countries is not caused by these flies.

The account of the return journey is very interesting, but time is wanting for its description; it will appear in the journal when printed, together with quite as interesting matter as that which I have here culled almost at hazard, so extremely interesting and full of information is the whole journal. The best part of the original journal, namely, long and most interesting conversations with Umzila and other chiefs taken down at the time, and which Mr. Erskine repeated to me on his arrival, is altogether omitted here; but no doubt we shall have similar and even more interesting accounts in the journals of his last expedition from Sofala to Umzila's with its numerous observations, which is expected by the next mail.

The people take elephant and other game by hanging up heavy spikes of poisoned wood which fall on them. An elephant goes about 10, a giraffe 5, an eland 3 miles after being struck.

We now came on his old friend the Limpopo, at a place called Matsamba, after the great Tonga chief there, which I mention, as he says:—"For the information of sportsmen I will add, that it is the beginning of the game country: hippopotami are in the river, giraffes, elands, koodos, lapabijes, zebras, wild pigs, gnus, and rhinoceros, are found in the bush. A few miles below the kraal they literally swarmed. Nowhere in Africa have I seen so much game. Game is not universally distributed; it is only found in localities—perhaps accidentally discovered, as this place was by me. I have already sent one friend there who came out to shoot, but he did not get within 60 miles of it, and yet did better than most. Elephants also drink at the river, and if followed up energetically, are sure to be found. *The Tabi or Sihlabi*, an affluent of the Apaluli, is about the southern limit of this game country. There are no great obstacles to getting here from Leydenburg, and doubtless now that the Zulu country is shot out, this will become a favourite ground with English sportsmen."

Arriving at his old point of what he called the "meeting of the waters," that is, of the Lipalulé or Elephant's River and the Limpopo, he found the latitude to be 24° 8′, being 34 miles more to the south than his observation in 1868, the error in which he explains as having been caused by erroneous reading. The longitude he now changed also (in consequence of that of Leydenburg being changed) from 33° 42′ E. to 33° 2′.

His journal henceforth is taken from notes which were saved in a pocket-book, and it is very minute and interesting, but mostly over his former ground. He shot an elephant and wounded another, which he pursued for two days, but without success. He found a good deal of game here—giraffes, ostriches, sea-cows, elephants, zebras, &c.

One day, seeing some vultures, they thought it might be the wounded elephant; they halted, and had hardly done so before they heard a loud purring in the reeds, on which his people ran up trees. Whilst his hunter was loading his big gun, a fine male lion came out of the reeds and stood at about 40 yards. Dropping on his knee, he aimed at his heart with his small Snider single rifle, and fired. As the lion's head was turned from him, missing the hollow behind the shoulder he hit him behind the ear, when he reared straight on end and fell dead. Two other fine males now bounded out of the reeds and made off. He followed them for some time, but losing the spoor, came back and skinned his lion, on which he found a thick layer of blubber, showing how plentiful the game must be here. He now shot a huge crocodile, which the natives eat. Here he came on some remarkable rocks, like elephants, and near them a well-marked hill, with a solitary round rock on its summit, which, as a landmark, he named "Rawlinson's Cap," after the President of the Society. They now saw the Drachensburg mountains of Natal quite plainly; it may be imagined with what delight. One night they were surrounded by lions, who roared round them all night, and were only kept off by constantly renewing the fire. Mr. Erskine sat with his gun on his knees the whole night, and the Kafirs also with their assegais. Towards morning the lions left. Here seeing a honey-bird, he sent his people after it, and got a lot of honey. As some have doubted as to this peculiar instinct of the bird in leading men to the hive, Mr. Erskine says that he has sent his people after them hundreds of times, and these birds always led them to honey. He gives the latitude frequently, and describes the country accurately. The Basutu people here live in caves in the mountains from fear of Umzila's people. They found some of them smelting iron.

They could get no food here, but luckily shot a waterbuck. Starting early one morning to catch some lions, who were roaring, they had not proceeded far before six huge males ran by, growling horribly at being disturbed at their meal. As Mr. Erskine had only the Kafir's gun in his hand (his own large double gun had been presented to Umzila), and as the dawn had scarcely broken, he would not fire. Here his carriers, thinking they knew better than he, went a different way and did not overtake him for some days after his arrival at Leydenburg, so that he was without bedding, utensils, and almost without food. He soon came to the first Boer's house, who would not allow him to put up there, thinking him a tramp who would steal his horses. He gave him an account of himself, which he refused to credit, saying that no man could live sixteen months in the fever country. Luckily he knew one Scoeman, a Boer, further on, where he got food and shelter. On this day he walked 33 miles, owing to the Boer's brutality, showing that he must have been in high health, although he had had the fever thirty times. Next day he made 24 miles to Leydenburg, his old friend Maclachlan's house, where he was received with open arms, and his troubles were over. Buying a pony and riding him and another (when done up) 50 miles a day, he reached home in Natal in good health and spirits—a great contrast to the spectre which appeared in my bedroom on his return from his first expedition, showing the necessity for medicine and sufficient bearers on such expeditions.

He now proved the truth of the old saying that no man can be said to be truly fortunate until he is dead, as now happened the greatest misfortune of his life. He had carried his journals the whole way on his person, but the rivers in Natal being up, and having to swim some of them on horseback, he was persuaded to put them into a waggon, where they were lost as above mentioned by their being washed away. I was astonished at the equanimity with which he bore this disaster. The patience of Job was impatience in comparison; and it might almost bear comparison with that of Sir Isaac Newton, when the labour of part of his life was destroyed by his little dog Diamond throwing a candle down among his notes. He had hardly rested and realised his loss, when he started again back to Umzila's *viâ* Sofala, this time on "his own hook," and amply supplied with goods by Messrs. Dunlop, Mees, and *Co., of Rotterdam, which* eminent and enterprising firm has been occupied for some years past in developing the trade on this coast regardless of expense. The journal of this fresh expedition, in which he had 40 hunters and 160 bearers starting from Sofala, promises to be of great interest, and, as he had proper instruments and more experience, will be *very* valuable. Since his return by sea from the last expedition, he has started again from the same region a fourth time, but finding trade brisk at Delagoa Bay has remained there for the present, sending out hunters to shoot ivory.

These explorations, and those in the interior north of Livingstone, Speke, Grant, Baker, Mauch, Stanley, Cameron, and others, show that there is a star rising in the south, the brightness of which promises not to pale before those of the north, the east, or the west, and it is to be hoped that it may not again be lost sight of as it was by its first modern discoverers, the Portuguese. There is a most interesting appendix on the subject of Sofala, and its ruins, gold mines, &c., and referring to old works on the subject; but I think that will be best dealt with when the journal of the expedition from Sofala itself is received.

Mr. Erskine concludes thus, after showing how easily by availing themselves of the dissensions of Umzila, the usurper, with Manomio, the rightful heir, and of those of the Matabelè tribe, the Portuguese could establish a strong empire at a trifling cost. "Before I traversed the country, I imagined that the climate was against progress by the Portuguese, but I now see nothing to prevent them from not only rivalling the English Colonies in Africa, but outstripping them in prosperity."

The country is in many respects richer, and very much more accessible on the seaboard. The Zambezi affords a navigable channel for some hundreds of miles, and unlimited land of the richest kind for rice, sugar, coffee, and cocoa, and other tropical produce of value can be found on its banks. The trade is now confined to ivory, indiarubber, bees-wax, orchilla, and hides, which are purchased at great expense by goods carried on the natives' heads.

The Rev. HORACE WALLER said there could be no doubt that some day interesting accounts would be obtained of the ancient settlements in the region which Mr. Erskine had visited. In olden times, a very great quantity of gold was brought from there. The Portuguese settlers, in their present effete condition, get a little from the south of the Zambesi; but English colonists from Natal were now working upwards to new gold-fields, and he believed it was rather from their feeling that they had better keep a good thing to themselves than from anything else, that more was not heard of the gold in those parts. Within a few years, probably, the produce of gold from South-east Africa would equal that of California. Of course one great difficulty to be overcome was the *prevalence of fever*. The fever poison was taken into the system on the sea-board, and developed on the high ground inland, just as country people coming up from Essex sometimes had ague in London, and imagined they had contracted it there, when in reality they had brought the disease from the Essex marshes. When he was on the Zambesi, he frequently heard the two names which Mr. Erskine had so often used; the one Gorongoza, and the other Muanakuss. The natives, who came down to Senna and Shupanga, where Mrs. Livingstone was buried, on the south bank of the Zambesi, called themselves the children of Muanakuss, and from Morambala he could see the great Mountain Gorongoza. It was rather peculiar that those names should have been perpetuated to the present day. In common with everyone present, he could not but feel much admiration for Mr. Erskine's qualifications as an African traveller.

Major ERSKINE said he expected by the next mail to receive his son's journal of his more recent journey from Sofala, and that, no doubt, will deal with the question of the mines. Nothing could more convincingly prove the existince of large gold-mines, than the fact that it was death for a native to speak of them or of the ancient ruins. All the chiefs showed the greatest jealousy about these mines, and it was therefore extremely difficult to ascertain their whereabouts. Gold can even now be bought in the country, and Mr. Erskine had brought some back in quills, which he had obtained from the natives. There could be no doubt it was a very rich country. His own opinion was that it was the ancient Ophir, but his son did not hold the same view. The Queen of Sheba's real name was Sabia, a name which was even now given to a river there. In some maps, Sofala was called Sophir. The "S" was merely a prefix, and it was therefore reasonable to suppose that the original name was Ophir. In a geography book, eighty years old, in his possession, it was stated that the value of the gold exported annually by the Portuguese, was about 3,000,000*l.* sterling. On his latest expedition, Mr. Erskine had 3500*l.* worth of goods with him, and arms, ammunition, and good instruments. His observations had been sent to the observatory at Cape Town to be verified, and therefore everything detailed in the journal would be absolutely correct. His explorations extended to within 2° of Dr. Livingstone's country. It would be a great boon to humanity if the country could be taken possession of by the Portuguese, or some other civilized nation. The Tongas were evidently an improvable race, much more so than the savage Zulus, who would never apply themselves to any sort of industry; but so long as the Zulus (who were a mere handful in comparison as regards numbers) were allowed to continue their depredations, the Tongas would never be able to advance, and in the end they must be exterminated by the Zulus. Some years ago, the Portuguese sent an army of 600 men into the country; but all, except the commander-in-chief, were destroyed by Bonga, to whom Mr. Erskine had referred. His son had undertaken four expeditions, entirely at his own expense: surely some other young Englishman was now prepared to take up the running.

The CHAIRMAN believed that everyone must agree with Major Erskine, that any civilized nation that would take possession of the country would be in a position to confer upon that part of Africa one of the greatest blessings. The atrocities, tyranny, and continual massacres that took place, were enough to make one's blood run cold. He hoped that bold and enduring Englishmen would always be ready to imitate Mr. Erskine. Although the occupation of tracing African rivers to their sources led very rapidly to the end of life, yet such men as Livingstone and many others had not been deterred from the task, and he trusted such explorations would never cease until civilization had obtained a firm hold upon Africa, and had converted to useful and peaceful pursuits the people who at present were entirely given up to frightful massacres and slavery. He did *not* agree with Major Erskine in the belief that the region described in the paper was the ancient Ophir. A verse in one of the Psalms spoke of the Kings of Sheba and Arabia bringing gifts, which seemed to imply that Arabia, and not Africa, was pointed to. The Tongas were the only African race, of which he had ever heard, who had come to the conclusion that war was an abnormal state, and not to be encouraged. They really seemed to be far ahead of some of their European brethren in that respect.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *International Congress of the Geographical Sciences.*

Since the publication of No. 1 of the present volume of the 'Proceedings,' in which (p. 59) were reprinted some of the circulars relating to the approaching meeting of the International Congress of Geography at Paris, the following letter, fixing the date of the meeting, and also of the Geographical Exhibition, has been received:—

" *To the President of the Royal Geographical Society.*

" Paris, 8th Jan. 1875.

" Numerous applications have reached us, requesting that the meeting of the International Congress of the Geographical Sciences may be delayed. The date, 31st March, has seemed too early and the season too little favourable for travelling. On the other hand, the Exhibition, which is associated with the Congress, having taken a wider extension, the selection of a building of larger dimensions than was originally fixed upon has become necessary.

" The Geographical Society of Paris has had recourse to the goodwill of the French Government, which has been good enough to place at their disposal the Palace of the Tuileries; the preparation of these galleries became, therefore, a new cause for delay.

" We have, in consequence, fixed the date of the opening of the Exhibition at the 15th July, 1875, and that of the meeting of the Congress at the 1st August.

" I have the honour, Mr. President, to beg that you will make known officially this decision to the Society whose labours you direct, and I hope this delay, in facilitating the co-operation of its members, will render our enterprise still more profitable to science.

" Veuillez agréer, &c.,

" Le Vice-Amiral, Président de la Société de Géographie,

" De la Roncière le Noury."

2. *On the Names of Places in Geography.* By Lieut.-Col. William Ross King.

The subject of the following remarks being unlikely to prove *apropos* to any papers coming before the meetings of the current Session, I address them to you in the present form for the purpose of being laid before the Society's

Council, and trust that the very imperfect manner in which I have represented the matter may not prevent its receiving that consideration which it appears to me to deserve.

My object, in brief, is to plead for the preservation of the native names of places visited by travellers from this country, among whom the contrary has been more commonly the practice hitherto.

For generations past it has been a prevailing custom with founders of new settlements, as with discoverers of previously unknown ones, to repeat, from the poles to the tropics, the familiar and inappropriate names of British and Irish manufacturing and market towns, cathedral cities, hamlets, and counties; or to substitute the Saxon and Norman names of their own relatives and friends in lieu of the more characteristic, more convenient, and usually more pleasing native designations already borne by the places they thus endeavour to distinguish.

The questions that naturally suggest themselves are these:—Is not invention possible, where a new name is really required? and where native ones already exist, may they not be allowed to remain? (as Sir Samuel Baker has so happily allowed them).

Few persons have an idea of the extent to which the custom of repetition I allude to prevails. It would be tedious to enumerate even a tithe of the instances that might be adduced, but I may cursorily remark that the Gazetteer contains twenty Yorks, nine Gloucesters, eight Cambridges, seventeen Lincolns, and so on, either as towns or districts, scattered over the four quarters of the world. There are seven Londonderrys in North America, another in New South Wales, and another in Tierra del Fuego; a Stratford-on-Avon in Australia, an Aberdeen in British Columbia, and a Dundee in Patagonia! In Canada I found myself in a second London, on a river Thames, in a county Middlesex. In South Africa, after having crossed the Great Range River, I reached Smithfield (there are, by the way, nine Smithfields in North America alone). In Southern India a Badagha village on the Nilghiris, which I first visited as Jakatallah, has been christened Wellington, as an improvement; though there are already two Wellingtons in New South Wales, one in Western Australia, one in Van Diemen's Land, another near Hobart Town, one in New Zealand, two in Upper Canada, two in the United States, one in the Arctic Regions, and one in Patagonia, besides those in this country!

Fortunately the map of Africa has hitherto escaped in a remarkable manner; but her turn appears to be approaching, as she comes more and more under our "civilizing influences." A Newcastle is already established inland, and Cheetham Hill near Kilimandjaro. Webb's River is substituted for the liquid sounding Lualaba, and we are threatened with Ballyhaggerty in lieu of Gouna, the beautiful native name of a village near Bagamoyo! Are these names to be inserted in charts of the nineteenth century? In most savage or uncivilized countries, as we are pleased to call them, the names of places have some meaning connected with their nature, or position, or history, and are therefore more appropriate than any other, and often also, as in the instances just quoted, far more euphonious than our own.

The late Lord Seaton, when in North America as Sir John Colborne, showed his appreciation of this in changing York, in Upper Canada, back again to its original name of Toronto ("a place of assembly"), so called by the Indians as having been a rendezvous of their chiefs in council.

I do not argue that it would be advisable or convenient to carry out similar changes to any extent, and it may seem at first sight very difficult to control independent travellers and settlers naming places after their own fancy; but I believe that the practice continues mainly because it has been a practice heretofore, and if the Geographical Society would discourage it in those who *travel under their auspices*, and use their influence with our Consuls and

Government Agents abroad, to obtain among emigrants or settlers the retention of native names, or the adoption of distinctive new ones, these unmeaning and confusing repetitions would gradually cease. And if the past cannot be undone, the maps of the few as yet unexplored regions that remain to be completed, may in time be filled in with names in their own languages and dialects; names which should be as distinctive and characteristic of each country as the races and tribes which inhabit it.

3. *Journal of Lieutenant V. L. Cameron*, R.N., *Commander of the Livingstone East Coast Aid Expedition.*

FROM UNYANYEMBE TO UJIJI.*

November 11*th*, 1873.—BROKE up from Kwihara. Got off with a portion of stores to Mekwemdwe, a small village about 2½ miles W.S.W. of Kwihara. Great difficulty with pagazi. Pitched tent in village. Felt parting with Dillon much. He and Murphy also started for the coast. Country cultivated; but in fact left for three or four years without crops, and brushwood growing. Small rocky hills scattered about.

12*th*.—Busy re-stowing and re-reducing personals. Some stores came out, but too close to Kwihara for the pagazi to keep together.

13*th*.—First thing went into Kwihara. Called on Kisisa and Elwale. Got advice as to roads, &c., and got some more stores out. On return to camp, found Murphy come for medicine for Dillon, who is worse.

14*th* and 15*th*.—Busy with loads. Got all out. News from Dillon: better.

16*th*.—Went on to Itumioi W. by N. 3 miles. Camped in village. Getting stores out. Country the same.

17*th*, 18*th*, and 19*th*.—Getting stores out. Still too close to Kwihara. Send on to-morrow morning all available pagazi to Kisisa, next village. Eight loads still at Mekwemdwe. Received a present of three ostriches from Kisisa: rather like a white elephant. Grand dance in village in honour of a preparation for sending a caravan to the coast. Arabs send news that they are going out every day. This waiting tries me sorely in temper. The masika is beginning. Thunder-storms and showers at night. Days oppressively hot. Thermometer in good shade, 88° to 90°.

20*th*.—Pagazi coming in, though slowly.

[Delayed here all the rest of the month, and up to December 29th.]

December 29*th*.—Off at 7 A.M. Wonderful to relate, got away without any bother with pagazi. Marched first S. 1·25, then S.W. 2; and then some Wanyamwezi at a small boma told Asmani there was a shorter road, and so he left the path, and a nice mess he made of it. We went S., S.W., S.S.E., E.N.E., E.S.E., S.S.W., S.E., and E.N.E., raining hard, path greasy and slippery, and marshy spot, up to one's knees. I don't think he quite knows now where he has been, or where he is. We got in here about 1.30, and Bombay was not up with the last lot till about 2.30. I feel very tired, as it is my first long walk, and felt stiff this morning.

30*th*.—Halted for food, and I am too stiff to walk; partly tired, partly a cold from the wet of the two last days. A good chance for drying gear. B.P. 12·336, 20·595, and 05 = 206, gives 3154. 3473 height above sea.

The Arabs are doing nothing against Mirambo, there being a dispute as to who is to take charge; the man who came up with the reinforcements, or Ziweli and Kisisa. The two latter talk of going to the coast. Sat up for sights, but too misty and cloudy. Got away in the afternoon. Marched 2½ miles w. by s. ½ s. Camped in jungle.

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* Vide 'Proceedings,' vol. xviii. p. 469.

January 1*st*, 1874.—Jungle march, w.N.w. 7 miles. Saw several antelopes and a lot of pigs. Secured one, which was regularly mobbed by pagazi, and killed by a well-thrown knobkery. Walked most of the way. Tsetse numerous. Went out in the afternoon to look for game: saw lots of tracks, but only one animal, which, I think, must have been the "Tragelaphos Spekii," although darker than the picture. Leo frightened him, so I only got a couple of running shots through the trees. The first, a shell, burst in a tree just beyond him, and a very little over; it must have been a graze. I am feeling much better in health and stronger, as is evidenced by my having walked about five hours altogether and not feeling very tired. Cloudy and misty, and no chance of sights. I am now steering by compass to regain the Ugalo road, which Asmani had brought us away from. He wanted to go down to Manyara's, and then begin to work towards Ujiji; but I have persuaded the caravan to follow me, and I go straight through everything, so we do not make so many détours. Country almost a dead level; no appreciable rise and fall. Almost all the trees acacias of various sorts. Piggy for dinner: very good and tender. I revelled in eggs at Shikuruh, having got two dozen good ones. Some men from Kisisa caught us up soon after we camped. Weather very pleasant to-day; a little rain in morning, and the sun not oppressive, and I able to step out and keep all the men on the stretch. Two pagazi ran during the night, but we managed their loads, and picked up a hunter in the woods, who volunteered for Ujiji and Manyuema, so he was duly engaged. These constant desertions are an awful bother; they have lost me forty days since leaving Unyanyembe, besides the amount of wages. It is no good sending for the runaways, as they are Wanyamwezi, and certainly at first will not go to their own village or to Unyanyembe. There is a rumour afloat that Mirambo wants to cut me off, but I don't think there can be any truth in it, as he would have to pass by a lot of strong villages, all of whom would fight him. If he does come, why I hope we shall be able to give him a decent reception. I should like to make a pagazi of him.

3rd.—Got off at 7.30 A.M., and took the road pointed out by Asmani; course w. ½ s., 9 miles, as water is said to be scarce. Soon after starting, saw a herd of fine large antelopes, but they were off before I could get within range. Obliged to ride most of the way, as my heel was very painful, and I was afraid of rubbing it. My donkey has taken it into his head to lie down and roll. He did so twice to-day, besides several attempts. Once he went down so suddenly, that I only just had time to clear myself. He has tried it once or twice before. I fancy it is from the irritation caused by the "Tsetse." Saw two Secretary birds, and a number of quail and jungle fowl. We halted some time on the road to wait for Bombay, who was delayed by the donkeys' loads all coming adrift. Altogether we marched over five hours, doing 9 miles. The country is lovely, except for its extreme flatness. Open grass, which looks green and velvety a short way off, interspersed with numerous clumps of trees and bosquets of shrubs. We saw numerous dwarf fan-palms. Day cloudy, but no rain. Light easterly winds in the evening. Water was not seen from just after starting, till our arrival in camp, and then it was like liquid mud, with blue clay; but it must underlie the surface everywhere, as Leo, scratching in a peculiar dry-looking spot, got to semiliquid mud after 2 or 3 inches.

4th.—Off at 6.30 A.M. Marched till 1.30 P.M., with a halt of half an hour or so. Course, w.s.w. 11 miles, when I saw a white rhinoceros, which I went after without success. Country lovely, especially round our camp, which is on the west bank of the "Ngombe." I saw some buck, and went after them. Got *a shot, and broke the leg of one,* but the poor brute got away. The Ngombe is almost a river. I am quite in love with the country. One almost expects to see a large house after some of the turns in the forest. Passed a dilapidated bark canoe about 1½ mile from the Gombe.

5th.—Halted to give the men a rest, many being done by the long march yesterday. Went off in the morning, at 6 sharp, to look for game, only saw one lot of buck, and they went off before I could get within decent range. I tried a couple of snap shots without effect. I was out till 9.30. Country lovely. Gombe in long reaches as far as one could see, and as wide as the Thames near Abingdon. Where we crossed there is a dry sand bank, about 40 or 50 feet wide, 16 or 18 above water, but the water goes off deep on each side. After very heavy rains the country is flooded for some 10 or 15 miles, which would give a rise of about 20 to 30 feet, and this road is then impassable. A crocodile made a grab at a man, who imprudently went a little way into the water, but luckily missed him. Water-lilies are abundant, and the views of the reaches with green turf to the water's edge, and clumps of finer trees than I have seen yet since the coast, disposed as if planted by a landscape gardener, are enchanting. Most of the trees grow on little rises or on the anthills, which must be islands in the time of inundations, but others grow right to the water's edge and dip their branches. I saw a large crane of a sort not described so far as I am aware. He had large blue wings and reddish legs and belly, but was too far off to describe accurately. He was the largest bird I have ever seen, except an ostrich. In the afternoon I went out again and saw a large boar with fine tusks, but he was missed shamefully. I saw lots of antelope, some were spotted like our English roe deer. I got a couple of flying shots and wounded one, but could not track up on account of its coming on dark. My shooting luck decidedly is bad. I have been walking pretty hard to-day for between seven and eight hours, carrying a rifle weighing about 12 lbs. all the time, and only feel healthily tired: I suppose I must have walked 18 or 20 miles, which, for Africa, is not bad. A week ago seven or eight would have played me out entirely. The Gombe begins near Unyanyembe and runs south south-westerly, curving very much, and does not drain into the Malagarazi, but down towards the Rukwa or Rwaha. They say it makes a way to the Tanganyika. I expect in exceptional years, when there is an unusually wet rainy season, the Tanganyika is relieved of its surplus water, *viá* the Rukwa.

7th.—Off at 6.45, and marched, 3¾ hours, to a village called Kwatosi. Country level till close to, when we reached a small hill, on the western side of which we are camped. Several deserted sites of villages on the road. Rain during most of the march. I suffered severely yesterday from having overtired myself the day before, and am not yet recovered from the effects of it. Soon after leaving our camp on the Gombe we were met by some of Sultan Taka's men, who wanted to know why we had not sent to tell him of our approach, however all went off well. We had to pay Mhongo 22 doti, he asked two guns, which of course I refused. We did not go to his village Kwikuruh as it lies out of our road. All the people here seem well armed, a very large proportion having muskets. We can see two other hills from here, otherwise the country looks as level as a billiard table, all one mass of jungle. The cultivation here seems rather rough after that of Unyanyembe and Ugunda. We were accompanied on our march to-day by some of the Sultan's men, to frank us through without paying more Mhongo. We are not allowed to camp in the villages, which I am not sorry for, as we get away much better than in a village, as the men are all at hand instead of being dispersed amongst the huts. The villages here are built in a mass of the thickest jungle, which is rendered more so artificially by planting milk bush, &c. One of the signs of the bonses is carrying an umbrella. It rather amused me to see a man without a stitch of clothing, except on his head, where he has placed his loin cloth, with an umbrella up, there being neither sun nor rain to call for it.

8th.—Course w.n.w. 10 miles. Passed several deserted clearings; villages were destroyed about three or four years ago, during the war with Mirambo, one of Sultan Taka's men still accompanying us. Path very tortuous. Country level jungle.

11th.—Looking out for sights. Night too cloudy all through. Obliged to stop for food, as it is with difficulty the people are induced to part with it, and the chief did not give permission for its sale till late yesterday. I am in very good spirits to-night. I have organized a party to start directly I get to Ujiji to go round the southern end of the Lake. I take Bombay, Asmani, Sambo Musa (cook) as cook and servant, and a boat's crew of 16 Askari and Pagazi. They will all be armed, so I shall have no bother about crews of Wajiji. Bilâl and Mahommed Malim I leave to conduct the transport of the remainder of the caravan to the other side.

12th.—Off at 6.15. Marched 4½ hours, w.n.w. and 7½ miles. Bamboo growing. Considerable descent. Soil in patches of reddish conglomerate sand, red clay, sandstone, and quartz; other parts sand and very light mould. Palms.

I thought we were to have gone on farther n.n.w., but all hands have set to work to build a Khambi, and the tents are up. Good water here, and supposed to be doubtful farther on, but I think there must be lots, as we have passed so many pools to-day. Walked most of the way, timing and counting paces. It is no good driving to go on, as the caravan is good tempered now, and I don't want to make them sulky, and they are carrying six days' food besides their loads. B. P. 205·35. Therm. 78°. Height above the sea 3810 feet.

By B. P. we must have risen considerably, and no doubt the Gombe does go into the Malagarazi. We certainly came down hill to-day a little to the Mloni. No chance for sights last night nor to-day, although there were not many clouds; but the whole sky seems covered with a sort of mist, and one can only see the stars dimly. Nothing can be more deceiving than the eye in estimating the slope of a country, and one is constantly put out by it. I should have said we had come down all the way from Shikuruh, if we had done anything either way, and we have risen 400 feet, certainly in over 60 miles that is not much. Yesterday, at Kwikuruh, we were informed that if we had been an Arab caravan we should not have been allowed to pass, but that they would have fought us, but that they know that the English do no harm, and only travel to see the country, so that we can go on all right; the man that said this was one of Mirambo's followers. No big caravan has been along this road for many years now except us. I believed Mirambo would have let us go through his own country if we had asked him.

14th.—Off at 5.45. Marched w. by n. till 10.30, 7 miles. Took half an hour's halt. Passed several sites of deserted villages, but the people are wiped out, either killed or carried away for slaves, through this war of Mirambo's. Thick jungle with occasional mbuga or swamps. The water in the bottoms of some of these was two feet deep, and overlaid with sticky black mud. Saw ferns to-day for the first time in Africa, came upon them quite suddenly, and they were growing thickly. Water is everywhere. Several fine Palms. General trend of the slope seems to be north-westerly. Mirima Ngombe's men, who kept with us yesterday, were off before us this morning, and have gone on farther. They had the usual little kinyamwesi games after leaving camp. Planting poles in the road, making sham perubi, &c., &c. Some of these Mbugas which we have passed, except that they are of small extent, would put the Makata to shame in respect of mud. To-morrow or the next day we shall have to pass some streams on the natural grass bridges, which I find are called "usisa." Perhaps this explains the route *viâ* Ugunda and Ushesua mentioned by Messrs. *Cooley and Macqueen.* They are not very wide, and are rather feared by the pagazi. The whole of the soil to-day, except in the Mbuga, was a reddish sand and conglomerate of quartz and sandstone covered with vegetable mould. The country seems very fertile, and once was well cultivated, as the marks of the ridges and furrows still remain. In some places we saw the burnt remains of the huts. It is indescribably saddening to pass through places, which once were the homes of happy and contented people, who may have been negroes truly, but now are either dead or slaves, and all caused by the unprincipled Coast Arabs. The Omān Arabs are far superior to those of Zanzibar, and if they alone had penetrated the interior, the state of the country would be very different from what it is now. We had several sharpish showers on our way. The wind being south-easterly.

I have been bothered by my hands swelling up, and now my left hand is like a dough bag, they get stung by some sort of grass; it is rather uncomfortable and inconvenient, but nothing serious. There is a village near here I hear; I thought we were not to have been near it till to-morrow; we are now avoiding it on account of the Mhongo. I find the village is about an hour a-head or thereabouts. (Mtimi Liowa Kwikuruh.) It is the capital of part of Ugara. Liowa's father (another Liowa) was chief of all Ugara, and once upon a time he set out to attack Bagamoyo, but got killed in Ugogo on the way down. The present Liowa succeeded, but Mirambo has smashed him up, and he now only owns a little bit of his former dominions. All or nearly all Ugara is now tributary to Mirambo, who is far more powerful than the Arabs represent him to be, and, if they don't look out, will drive them out of the country. He manages to get all the supplies he wants from different villages, who send down to the coast, and who are but allies in secret, whilst they profess friendship to the Arabs, besides which there are many disreputable Arabs who are ready to supply him with anything. I have no doubt he has a very jolly life of it, and laughs at the Arabs and their futile endeavours to subdue him. I am getting quite to feel a respect for him. A very heavy thunder-storm came up from the westward in the afternoon, and the rain came down in torrents, and there were some heavy hailstones. I am trying the experiment of a fire in my tent to keep off the feeling of dampness, and prevent guns, &c., from rusting and rotting. It is rather smoky work, but I combine the wood smoke with tobacco ditto, and try to think it all the latter.

Height above the sea 3799 feet.

15*th.*—Camped near Liowa's village. It is no use trying to get the pagazi to go on; they say they were not all able to get food at the last village, and they cannot go on without getting some. The village is very large. The population turned out to stare, they seem the most eager to have a stare of any people I have come across yet, coming out to meet the caravan and running alongside of it, then halting to stare, and on again. Leo attracts much attention, he is cordially thought much more of than even the Msungu. I am afraid that this is an expensive village, as I see a great deal of new cloth about.

Some marshy bits to-day; red sandy soil. Settled Mhongo for 18 doti. Chief sent me a small goat and some mtama. Could get no food to-day, as permission to sell could not be granted until Mhongo was settled, which was not till late. This stopping is a great nuisance. I find I made a mistake about the food at the last Kwikuruh. I told Bombay to give us six days for the road, but he only gave six altogether, and as we were there two days, it only left four for the road, which would be finished to-morrow. Thunder and lightning. I feel very seedy this evening, and am afraid I am in fever, so here goes for quinine.

16*th.*—I feel all right again this morning, except for a quininy sensation in the head. If I had not that, however, I believe I should have fever, and of two evils the lesser is best. The people here cultivate very large quantities of sweet-potatoes, which form the principal part of their food. Tattooing prevalent. Many of the men have extracted the two centre lower incisors, besides chipping the upper ones.

Here wire seems to be coming into fashion, and several of the men wear fringes of long hair round their legs, the upper part about half-way between knee and ankle, and reaching down to the ground; they are kept from slipping down by a couple of thongs tied round the leg just below or above the knee. Hair worn in every shape and form. Here we are in for a wander again, as the usual road is closed by a colony of runaway slaves of the Arabs, who are all reported to have muskets and to plunder all they can, joining occasionally with Mirambo for a row with their former masters. It is either five or six days, as far as I can make out, to the place where we cross the Malagarazi and four or five more on to Ujiji. I make us now, by dead reckoning, about 30 miles S.E. by S. ½ S. from Mpeti, which would agree pretty nearly with Burton. The country seems hilly in front.

Bombay lectured the camp both last night and this on the necessity of keeping a good watch and not sleeping too much; and to-night he told them all, that all stragglers would be certain to be killed, as the woods were full of Ruga Ruga, who would be on the look out for what they could get.

17*th*.—Got off at 6.30, and marched W.N.W. 3½ miles. We came down hill all the way but the last half mile, which was through a swamp. We were compelled to halt by the torrents of rain; it came down, I think, as heavy as ever I have seen it. It was an awful bother, but both men and donkeys refused to face the storm. Squalls of wind, principally from south. I heard the sound of the rain before it reached us, just like the sound of a large waterfall. Got the tents up, &c., and luckily nothing was much wet; Murphy's waterproof kept me as dry as possible, but the men were dripping; several of them adopted the costume of our ancestors, Adam and Eve, in the early days of the Garden of Eden. Ferns again to-day, same sort as before. No use dreaming of an afternoon march as the boma requires time to make, and it is only prudent to have a good one in these parts. I find that these runaway slaves have been settled here for many years; they were here in the time of Burton and Speke, but they have been reinforced lately by several of the armed slaves, whom the Arabs had sent against Mirambo, and of course are of more importance and more formidable than ever. Beards more numerous and larger in last village than any I have seen yet. A small party of Wanyamwesi (about 7 or 8) have attached themselves to our caravan for safety. Mirima Ngombe's men are still in Liowa's village; they did not start this morning, on account of the rain, but intend, I believe, rejoining us to-morrow. Saw several small vultures on a tree near camp. Got a shot at one, but only knocked a lot of feathers out. Some of the men have been trying to take a hive of bees, but all the combs had grubs in them, and there was no honey. To see a couple of men, almost naked, up in a tree hacking and pulling at the trunk, surrounded by swarms of bees, and only stopping occasionally to pull the stings out, but apparently not fearing them a bit, was to me a marvellous sight; their skins must be like that of the honey guide, almost impervious.

18*th*.—Off at 6.30. Marched till 12, W.N.W., 10 miles. At first our way lay through open wood; soil, red sand. No undergrowth; and we saw a large herd of large antelopes, but did not succeed in getting any. I got two shots through the trees, and I saw, and also some of the men saw, one of the shells burst on a beggar's shoulder, he tumbled down two or three times, but we lost the tracks, and so we were not able to follow him up. All this time the country was rising slightly, when, all on a sudden, we came to a steep dip without crops of granite and sandstone, almost precipitous in parts, down the sides several little brawling torrents leapt and crept, sometimes hidden by grass, and sometimes showing one like miniature waterfalls. We did not get to the bottom of this valley, but crossed the south-end of it; it lay nearly N. and S., sloping to N., up a gentle rise and on some way, when the same thing was repeated, only that time we came upon a stream in the bottom, 40 feet wide, and from 2 to 3 feet deep, between the rocks, with which the bed was almost filled, and every here and there forming cascades of 3 or 4 feet drop. This stream is called the Mtumbo, and runs into the Sindé (Sindy), which runs into the Malagarazi. The water was beautifully clear and bright. It was quite a new sensation to see running water, I have not seen any since the little runnels in the river-bed at Mpwapwa. We see hills in front of us running N. and S., or thereabouts. I have been having an investigation, as far as I can, into the river-system hereabouts. I find I had mixed up two Gombe's: one from Taborah (Burton's) goes into the Malagarazi, the one I and Stanley passed also goes into the Malagarazi, and is joined on its way by the Walla, the Mto, I heard, about at Hisinènè.

The dry Mto we passed after 2nd, Ugaga (or Utende) also goes to Malagarazi. The Mtambo has its rise in the southern part of Utendè, where it is usually a dry river; it runs westwardly first, and then N.W., and receives two or three smaller streams; it joins, about 6 or 7 miles from here, the Niomenzi, which comes from the S.S.E., and the united streams run into the Sindy close to the Malagarazi, which receives them all. Between the Sindy and the Tanganyika the Malagarazi receives several small streams on its southern side. I think I now comprehend the watersheds. The high land just before Unyanyembe separates the Lufiji basin from that of the Tanganyika, and going west from it a smaller ridge separates the basins of the Malagarazi from that of the Likwa. The southern limit of the basin of the Lufiji is the highland crossed by Dr. Livingstone, before reaching the Chambezi, on his way from the Nyassa, and it is the western side of the highland, that forms the eastern limits of the basins of the Likwa, Chambezi, and Marungu, which are again divided in an east and west direction, by lesser elevations.

The Likwa only joins the Tanganyika during the latter part of the rains. It is about 40 miles long, in an E.N.E. and W.S.W. direction, and about 15 wide.

We were joined again to-day by Mrima Gombe's men. They had come on as far as this yesterday, after the rain, when they lost heart; and to-day we met them coming back to join us, as they were afraid to go on by themselves, on account of the disturbed state of the country. Our boma to-night is quite a formidable affair. Very heavy showers this afternoon and evening; but the men had time to build their huts, and make themselves comfortable before it began. I'll back the East African to make a camp against any man. I have picked up a lot of wrinkles on the subject. Thunder and lightning. Lying awake, and listening to the rain. If the blessed old Tanganyika gets all this water, it must burst out somewhere! One can hardly hear the thunder for the rain, though the storm is close to us.

Just had a fright! About half-a-dozen tent-pegs drew, and I was afraid the tent was coming down. I slackened the pole, and yelled like a madman for the Askari. The first man that came was one of the pagazi (Baruta Manga), stark naked, of course, who wanted to know what was the row; and then Bilah and some Askari, and we prevented the catastrophe.

19*th*.—Heavy rain all night, but now it is holding up a bit, and we shall be able to get away all right. Course, W. to N., 3½ miles.

After some little trouble—a pagazi having run away in the night—we got away soon after 7, and marched for two hours, when we saw some buffalo; and Asmani and some others went after them, and shot a buffalo and a rhinoceros; and whilst we were waiting for the meat, the rain came on, so that we had to camp. Country undulating; red sand, granite, sandstone, and conglomerate; open forest. Had some more conversation with Bombay and Asmani about rivers, &c.

The Kwaka, in the upper part of its course, is only like the Gombe's, Mabunguri, and Mdaburu Nullahs, a chain of pools in the dry season (this tallies with what I heard at Mdaburu). The main stream of the Lufiji comes from the country of the Wafangi, near Yow. It takes its rise in a large Mbuga, or swamp, and, after running some distance, descends into the lowlands by a series of falls.

20th.—The men won't go on without their meat, and here we are delayed for a day. No rain—no sun. A beautiful day for marching. I can't go out shooting, as I am dead lame from bites and stings on my feet, and a centipede bite on the calf of my leg. I don't know who is the head to-day; but Bombay and Asmani both professed readiness to go on, and the former attempted to make the men take their loads, but it is no use. I shall spend the day writing and mapping. I suppose the men are not so much to blame after all. They have no reason to be in a hurry; and they so seldom get meat to eat, that the prospect of a good feed intoxicates them. Got my journal and map up to-day. My leg is very painful.

21st.—Got away at 6.20 A.M. First, level; then a little dip up a hill; down 6°, and crossed the Nïomanzy after two hours' march, W. to S. 3½ miles. Halted to wait for Bombay and the donkeys. Soil red with outcrop of granite. Jungle and undergrowth. The Nïomanzy runs north, with grassy banks; but big stones in the bed. About 20 feet wide, 3 feet deep, running 3½ miles per hour. I am perfectly lame to-day. Leg very painful and swollen. After another hour's march, during which we crossed another little stream, and drew away to S.W. by W. The Kirangezi lost the road, and we had to halt whilst he looked for it. After about three quarters of an hour, Asmani said he had found the road, and we went on again down another hill, and across another stream, and up again, when Asmani was at fault again, and couldn't find any road, so we camped and sent out scouts. Altogether we marched four hours, and did 6 miles W.S.W. The reason I did not take the compass was, that we were marching for a village, where we intended getting a day's food for the Askari on our way to Woinza (their food being out to-day), and I did not know its position, beyond being told it was on a mountain. Asmani and the other men, who have been out, report that on the road I want to go there is an impassable marsh, which we must circumvent; and that the way we have to go there is "a plenty mud." All about here was settled two or three years ago; but "all village broke up again," says Bombay. I fancy Mirambo's motto is, "If not with me, against me," and proceeds accordingly. It is making a long journey to Ujiji; but what with rain, mud, &c., one cannot drive a-head as one would wish. I am so perfectly lame to-night, that I cannot walk a yard. My donkey and I had a tumble to-day. We were climbing up the side of one of the river-beds, when he slipped, and some earth gave way. Luckily, I saved myself by clinging to some handy branches; but he got so jammed, that he had to be regularly lifted up out of a sort of rut he had got into.

22nd.—Got away at 6.15. Marched first south-west for three quarters of an hour, and then passed two ravines, which were impassable lower down; then W.N.W. for another three quarters of an hour, when we came upon a river, which we crossed. The bed was completely filled with large lumps of granite, and the water was flowing underneath them. Some little way before reaching it, the whole ground was sheets and blocks of granite. Here we had to wait while the donkeys and their loads were got over, and up a steep earth bank on the west side of it. All the streams here have their eastern sides rocky, and western, earth. The country lies generally in this form.

All the country is well wooded and apparently fertile. Soil, red loam. *Often the trees are red half-way* up from the earth, carried up by the ants in forming their galleries. We have found the proper road (a Njia Kubwa, I am told), leading about N.W. to Woinza. It is a great nuisance that I am unable to see the donkeys got across; but I am so completely lame still, that I cannot walk without assistance, although my leg is better than it was yesterday. All these streams that we have passed are intercepted by the Mtambo, which joins the Sindy, which flows into the Malagarazi.

After about an hour's march, N.W. to W. through open wood, I saw a general panic amongst the caravan. They all threw their loads down, and were skedaddling every way: a lot got up into the trees. I thought the Ruga Ruga, lions, tigers, and all sorts of wild beasts had attacked us. It turned out to be a solitary buffalo. I saw him pass close. He was coal black, with long curling horns, and about 12 hands high. After we had made our N.W. by N. course for three hours we came upon another river, which was deep, and took some time to cross, as it was 4 feet deep, and running pretty fast. After crossing it we made our camp. We lost our path again, after finding it the first time, for half an hour or so. All the tracks here are overgrown, there has been so little traffic of late, and every caravan takes a different road to prevent surprises and attacks.

Everyone seems adrift as to the country, and all the men's food is finished, so we shall be off sharp to-morrow.

23rd.—Got away at 6.30. Marched N.N.W. 1·5 mile, and came to a big stream just above its junction, with the one we crossed yesterday. It was 30 yards wide, and 7 to 10 feet deep. Brought the boat into play, and got everything across without accident in three hours. The Wanyamwesi with us. Built a bridge, but it was not sufficiently finished for loads by the time we had crossed. We hauled a couple of donkeys across, when one adventurous one swam over of himself, and the rest followed. After crossing the river, we followed its course a short way, and saw it run into a plain. We continued along the spurs of the hill, till we came into the same plain at some distance from it. After three hours' march, we camped, and a lot of men started off to look for a town, as they are beginning to feel hungry. I rather hope, for one, they may find it, as I have had no meat for two days, having respited a goat (the little creature was so tame it came and eat out of my hand). I could not find it in my heart to have it killed; and dry bread and tea or coffee don't make much of a meal after a march.

Soon after we were in camp, the men saw some game, and went after it. Shortly after there was a devil of a row, guns going off in all directions; and Pesa (the donkey boy) rushed into my tent with his hair as much on end as it could be, and sings out, "Master, master; ruga, ruga, ruga. Shika bunduki!" so I got hold of a gun and limped out. More than half the men had vanished altogether; clean gone, like a conjuring trick, and the others hopping about amongst the trees as if they were hung on wires, and blazing off guns in all directions. All the excitement turned out to be caused by an old gentleman, who was out getting bark to make some cloth for himself and his wife (certainly he was in need of it), having only the veriest apology for a fig-leaf in front, and ditto behind. He says the village is not very far off; but there's no use trying to go on now, as the skedaddlers won't be in for a long time. We sent a couple of men with the ancient to be shown the road, and made his heart happy with a shukkah of satiné. I suppose we shall get to the village all right to-morrow; and I think I must take a day's rest, for the sake of my leg, although it is better; but still it would not have allowed me to run away, had I wished to do so, when the alarm of "Ruga, ruga!" was raised. I don't know what we should have done without the boat to-day, or what we should have done at all without the two bell tents (all of which we owe to Major Smith's thoughtful kindness). The three-pole (Edgington's) is still lingering on, in an advanced state of consumption; but none of the original canvas is there. The roping is now giving out, and if it does for the stores for this rainy season it is all it can do.

It is an awful nuisance not being able to find out anything for certain about the distances and bearings of the stations a-head of us; but I suppose we shall know all in good time. We seem for the last two or three days to have been in a country of which nothing is known by anyone in the caravan, although we have Wavinza and Wagura, besides lots of Wanyamwesi, who have made the southern journey before. Height above the sea 3794 feet.

Height of hills runs in places about 400 or 500 feet above where we are now. We have decidedly risen since we left the foot of the hill we came over since the last river. We are running our high land farther west than Burton did on the north of the Malagarazi. He says nowhere were they above 1850 feet ('Lake Regions,' ch. vii., page 205, line 11), which, of course, might be 2850 feet, for I don't think there can be a tumble down of 2000 feet from here in so short a distance; besides which, there is high land in front of us.

Find a lot of men have gone on to the village to get food, and so we shall be delayed in the morning.

24th.—1 P.M. Heavy showers during the night, with thunder and lightning. As I thought, detained here by the men, who have gone off for food. They would not go on there yesterday with their loads, and to-day we have to wait for them. I wish I could find out some way of controlling them. They say they are going out to cut wood, &c., and are no more seen.

Got away, after much trouble, at 3.15 P.M. We were all ready, but six men were absent soon after 1 P.M., and what to do with their loads puzzled us. Shortly afterwards they came in, bringing a zebra, which an Askari had shot. Like a sensible fellow he hadn't made a row about it, but got hold of some men quietly, and brought it into camp without being torn to pieces, and Bombay was able to serve it out regularly. We marched N.W. by W. 4 miles, when, as it was getting close to sunset, we halted for the night, and go on to the village to-morrow. I find, from the natives, that the river we crossed yesterday was the Nïomanzy, and the one I was told was it has no name.

25th.—We got away soon after 7, and after marching an hour W. by N., mostly down hill and a good deal through a marsh, the rest open jungle, came to a stream flowing to the north. It was 25 feet wide, and about 8 feet deep in the middle, running 2 knots. There were no trees near its banks, but thanks to the boat we got everything across safely. We camped on the western side, close to Màn Como's village. Màn Como is the chief of Kowende (Uvenda), and does not ask for mhongo. Here we have to get food, and I intend to stop to-morrow, in order to let my leg get well; it is wonderfully better, but I think a day's rest will do it more good than all the dressings, &c., in the world. Mtama scarce here, but sweet-potatoes plentiful and good. I find there is a ferry two days on from here, before reaching the Sindy, which I shall go by, as I don't admire the idea of a grass bridge. Just beyond the village here is a high steep range (1000 feet) of hills; the upper part are regular cliffs; the river we have passed flows close by.

26th.—We could get only one day's food here, so we go on again to-day. 12½ dotis for one day is too much to pay, and although the people in the village have lots of food, they won't sell it. The village is close to the bottom of the hill, and the rocks come down into it, and they have a way they can close up into them. Mirambo came here to attack the place, and could find no one and no plunder, as they had hidden themselves and belongings in caves and holes in the rocks.

The chief asked for 50 doti Mhongo, but as it is never paid here I refused it, and said if he had behaved properly I should have given him a present, but *that now he should have nothing.* I believe supplies are to be obtained at the end of to-day's march. I have to be carried, as my donkey has a sore back, and I can't walk more than a very short way, although my leg is ever so much better, but I am very much afraid of using it, for fear of making it bad again. Have been bothered here by a plague of small ants, which have been crawling all over me, and the sensation is not agreeable. I have slung my chair to a pole, and am being carried by two Askari at a time. The reason of our being asked for mhongo by Màn Como is, that some of the Wanyamwesi travelling with us told him that we had been giving it in Ugara, and that whatever a chief asked for I would give.

We are going, first of all, N.W. by W. along the lay of the hills. After an hour, kept away to W.N.W., rising up the hillside to cross the northern spur.

Just passed a pig, killed by some wild beast, most likely a lion. Kept along W. by N. ½ N., passing through a gorge between two hills, both precipitous granite rocks, and then kept away again. Passed several little torrent beds, and in some of them there were slate rocks. Marched altogether 7 miles W. by N. Fine big hills, with precipitous sides of granite rocks; clothed with trees right up to the summits, wherever the soil can lodge. Passed a stream, about 25 feet wide and 4 feet deep, just before getting into camp; I have rather the sensation of a stiff neck, as I have had to hold my head on one side all the way, in order to keep clear of the pole to which my chair was slung.

Misingwallah is the name of Màn Como's village. Màn Como sent after us this morning, with a present of a goat, some pombe, and corn, and reduced his demand to 4 or 5 dotis. I said if the men would bring the things on to our camp I would give him something, but I couldn't stop the whole caravan and open loads in the jungle. They didn't do it, but returned with their goat, &c.

27*th.*—Got away at 6.30. After an hour we got to the top of a high hill, having come W.N.W. from camp; it was regular climbing work most of it, and I had to get out of my chair, to be lugged up by hand. Bombay goes round a longer way with the donkeys. The men say they can see the Tanganyika; I can't make it out, and think they take the top of a level hill for the water. There is a splendid view up here, rocky hills all round, spreads of emerald plain and masses of forest all laid out at one's feet.

After all, Bombay and the donkeys made their way up the hill after much trouble; all of them had to be unloaded, and it took nearly two hours to finish it off. Afterwards we went along the tops of the hills, rising and falling a little; in several places the hill-tops were not more than 100 yards wide, with precipitous sides. About 12 o'clock it came on a regular pelting storm of rain, and I was soaked in less than five minutes, my waterproof being with the donkey boy, who brought it in about half an hour. The whole of the hillsides were covered with running water, forming little torrents every 10 or 15 yards; it reminded me of the streets of Catania, after or during a thunder-storm on Mount Etna. I remember it there well, the people had bridges which they used to put across the streets for the time, and the small boys used to dive for coppers, thrown from the cafés. Both there and here 15 minutes after the storm was over the water had nearly all run off. We did not get here till past two, our Wawende guide having told us it was only a two hours' march; we were marching six hours solid, besides the two hours spent in getting the donkeys up the hill, but owing to ups and downs and curves, &c., we did not make good more than 8 miles N.W. by W. I was very glad to get my tent pitched, and get into dry flannels and into bed, for I was just like a drowned rat, and felt miserably cold and shivering, and thought, if I don't look out, here goes for a bad cold and fever; however, now I am comfortable and dry, and hope to feel no ill effects. I should not have cared if I had been able to walk, but to have to sit in a chair to be rained upon is anything but pleasant.

There are two or three villages near the camp. I hope something to eat may be obtainable for the men, as they have had only six days' food for the last eleven, besides the two feeds of meat, and they must be *getting* hungry. They eke out their rations with mushrooms, and a variety of wild herbs and roots, so they are not so badly off after all.

28th.—Stopping here to-day to buy food. We are not nearly so high as we were at times yesterday, but we have come up an inch by barometer; I wonder how much we are up. Unable to move out of my tent all day or do anything on account of my leg. The men gone for food, not back at sunset, so I fear, there will be a delay to-morrow. Height above the sea 4938 feet.

A pretty good height. Close to our camp the sides of the hill go down almost perpendicularly (quite so in parts) for 500 or 600 feet.

29th.—Most of yesterday I spent doctoring my leg. I lanced it and causticked well, and the good effects are visible this morning, although it kept me awake all night. I hope now it will be all right in two or three days. The men not in this morning, and here we are jammed for another day. Some are come back who did not persevere the whole way, and say the village is some way off, and they have to climb a precipice to get into it. All the people here are afraid to build in the low lands, as the Arabs take them for slaves, and the Wavinza do the same, selling them at Ujiji, consequently all the level strip along the river, as far east as Mpete, is occupied by the Wavinza, who thus have the whole command of the Malagarazi ferries.

30th.—Delayed again by men being away, who did not come in till the middle of the day, and then it came on to rain, so that we could not get away. I find that, although Màn Como claims to be chief of all Kowende, his authority is very little regarded. Every village headman claims independence. The villages are all small; the largest not containing more than 70 or 80 *men*, and the smaller ones running down to 5 or 6.

The villages are built on the tops of precipices, or close to or among the rocks on account of the forays of slave-dealers, both Arab and Wavinza. The Wavinza almost encircle Kowende, bounding it on the north, west, and south.

31st.—The goat—I have called her Dinah—is most horribly tame; she is so friendly that at times she becomes rather a bother, coming into my tent and getting up on my bed, which she seems to think she has a perfect right to, as, however often she is turned off, back she comes again. I have frequently to get her tied up to get rid of her. We have a good day for marching; no sun, and I don't think we shall have much rain. I wonder if we shall fetch the Malagarazi to-day; according to the guides we ought to do so, unless the road is very bad. All the country here was well populated some few years ago, but the slave-trade has depopulated it almost entirely; the little food we did get, we were told we were only allowed to have because it was a white man's caravan, the people saying that they would sooner destroy the food than sell it to the Arabs. Old Leo does not admire the barghami at all, as whenever it is sounded, he begins to howl like a maniac.

We first came down a steep bit and then along a valley, lying N.E. All the bottom of the valley was well cultivated, and the fields fenced in with strong fences of tree trunks, either planted in the ground, close together, or in double rows, some little distance apart, and filled in with branches. We saw two or three villages, and a few of the inhabitants, mostly large people, and brown in colour, tattooed extensively, and with very little clothing; what they had consisting either of skins or bark cloth. I can't make out the difficulty about food, as from the quantity of cultivation there must be more produce than can be consumed by the inhabitants. The country is lovely, fine large hills with rocky sides; one village was built under a big rock, some of the people living *in regular caves. This valley* seems very hot and close, but the day is naturally a sultry one. Some more rock villages. I expect Bombay is having some trouble with the donkeys, as the path is very narrow in parts, and some of the fences are only open half-way down, with a ladder of two steep steps on each side.

Feb. 1st.—Down again to about our old level. Yesterday just after the tent was up, and before the ditch was finished, it came on a heavy thunder-storm, and I was regularly flooded out, and when it stopped had to shift my bed and entrance. Two men have gone off, in the night, after food; they had three days' food and lots of time to get anything that was to be found in the villages we passed yesterday, and now there is trouble about their loads, which delays our getting on. The second Kerangosi (Sadala) knew of their going, as they belong to his khambi or mess, and said nothing about it till this morning. I believe he did it out of spite, as he was grumbling yesterday about the march being long, and had a row with my servant, of all men in the world, about it. We crossed the river, in the bottom of the valley, twice yesterday, besides two others close to the camp, all three were about 4 feet deep in the middle, and about 15 to 20 feet wide, all running 2 knots an hour. I got a good sleep last night, for the first time for about a week, as my leg has been keeping me awake, and feel all the better for it. My leg is decidedly on the mend, but these large sores are tedious affairs in this climate. First hour N.E., still passed one or two small ponds, and then across a marsh with the water up above the men's waists, and all running down hill, after this we crossed a stream running east, which evidently intercepts the water of the marsh. In the marsh we saw several very large birds,—black wings and tail, white necks, backs, and bellies, and a scarlet head (naked) and pouch—I think they were a sort of pelican. The goat and dog swam the marsh and river in loving company. For another hour we kept our course, and then gradually kept away to the west. Altogether we marched seven hours N.E. by N., and did 7 miles. About an hour before reaching camp we came upon the Sindy, running nearly due east and west, but just before we struck it, turning north. It is full of Kiboko (Hippos). I got a couple of snap shots, but only managed to frighten them. Saw white herons on the banks. Numerous birds, yellow sparrows, red and green, black and white, and other coloured jays and woodpeckers.

To-morrow we cross the Sindy, and get into Uvinza (or more properly to the Uvinza villages, as we are already in Uvinza), where, I am sorry to say, we shall have to pay mhongo. Some of the village people came out after we were camped, bringing manioc for sale. We have got almost out of the hills, although in places they come right down to the river, and there is one big one between the Sindy and Malagarazi. Some of these hills are steep to their base all round, and will never be ascended without balloons or scaling ladders, neither of which at present form part of the furniture of an East African hut.

2nd.—Heavy rains during the night. Course N.W. 30 miles. Just after leaving camp we crossed over the Sindy on the grass bridge; it was quite easy, and nothing dangerous, as I have been led to expect. Part of the middle was so firm that one might have thought one was on proper ground, more especially as earth had lodged on top of the grass, and ferns, &c., were growing there. However there was the water underneath, as I shoved a stick through to see. The river is about 100 yards wide, and this growth continues for half a mile or so. They say the hippos pass underneath, from one end to another. After crossing, we passed a marsh, and then went along a rise through cultivated ground, passing several villages, and camped in one. The ground seemed well cultivated, growing Sem Sem, sweet-potatoes, yams, pumpkins, mtama, and Indian corn, so I hope we shall get something to eat; I am tired of bread alone, and have a regular craving for some change, though I have been only three days on it at a stretch.

The village is populated by Wavinza, Watosi, Wanyamwesi (who have come here to be clear of Mirambo), and some runaway slaves of the Arabs. They seem very civil, and brought me a goat and fowl directly we got in, and with some eggs found in a wild duck's nest in the marsh, which made an omelette, I had a pretty good breakfast.

As soon as the tent was pitched, some of the swells brought the chief (a boy about 7 or 8) to pay me a visit. He seemed very much afraid, and began to cry; however, we pacified him, and I showed him some pictures in an old bit of the 'Illustrated,' which came out of one of the boxes which were being unpacked. As everything inside was wet, I shall have to stop here to-morrow, to settle mhongo and to dry things, if possible. Three of my tin cases have bad holes knocked in them (old sores received on the journey from Paris to Brindisi, and patched at Zanzibar), of course close to the bottom, and when my tent was flooded, the water got in. Caps, matches, drawing blocks, and a lot of botanical specimens. I didn't have any sleep last night, and this morning Sambo gave me very strong coffee, instead of cocoa, and my head feels all inside as if it were on wires. I feel as if I wanted sleep, but have not the inclination; however I must try.

3rd.—A lovely morning, and I am getting everything spread out to dry.

Settled mhongo for crossing Malagarazi (Masaro); we have besides to pay the ferry people. The scenery here is lovely, hills coming to an abrupt termination, forming regular bluffs and capes. The whole gives one the idea of having been an archipelago in some ancient sea. Got two latitudes, mean gives 5° 15′ 56″. I am too much north by my dead reckoning. I fancy the mistake has been in not allowing enough westerly variation; I have only allowed a point, and it is 15°. So I must re-protract all my route, or else strike it off by lines and bearings.

The night came on misty, or I should have stayed up for a lunar; it was rather close work getting the stars (Capella and Canopus) as at times they looked quite misty through the inverting tube. I find a sort of inclination to halt here another day in the caravan, which I am determined to thwart if I can; Bombay says food cheap here, stop a day to buy; I say, why didn't you find this out for me before and get it, you've had a day and a half. Stopping a day to pay 10 dotis for two days' food, instead of seven or eight for one, I can't see as an economy at all. The real truth is, goats and fowls are very cheap here (a goat or eight or ten fowls for 1 shukkah), and they want to eat meat. I shall blame Bombay if we don't get away, as it will have been all his fault.

Our mhongo here is not so large as might be expected, but if we could have given guns, powder, flints, &c., we should have got off much cheaper, as the heirs of old Mzogera, the late Chief of Uvinza, are squabbling amongst themselves as to who shall have the whole; or rather, perhaps, each is scrambling for what he can get, and of course arms, &c., are at a premium. I wish I could have all the people at home out here for a day or two, to give them an idea of the glorious country we are travelling through, although, I fear, this latter part is rather against a railway.

6th.—Here Bombay comes and says no food to be got on the road, and the men will run back here, &c., &c., and that he couldn't get it yesterday till mhongo was settled; there is a great deal of truth in what he says, so I suppose one must give in. The fact is, the whole country is in such a disturbed state, that one is never sure of food at all, when one cuts adrift from one place, till one sees it again. Any place may be wrecked in a night, and all supplies destroyed or carried off. Very busy all day packing, taking guns to pieces, cleaning locks, &c. No use trying lunar, as the mist hangs round the moon, so that a clear limb is unobtainable.

7th.—From Utambara, Chief Lusunzu. Marched N. ½ E. 9 miles. Arrived at village Ugaga close to Malagarazi. Mutware's name Mhwisa.

Slightly downhill all the way, with a steep dip just before reaching the plain through which the river runs. Jungle road, but numerous shambas and villages. The plain seems pretty fairly cultivated. The Mutwari or chief, here, rather amused me. He came to pay me a visit, and I was lying down and had taken off my boots and stockings; I sat up on the bed and made room for him, and showed him guns, revolver, etc., and pictures in natural history book, when he suddenly caught hold of my toes, and began to examine them. He said he didn't think my feet were made for walking, they were too white and soft; and after that, he transferred his attention to my hands, which certainly couldn't be called white, as they are turned to the colour of a dirty dogskin glove; however, he came to the conclusion that I was a big chief, as I did not seem to have done much hard work. The mode of salutation here is very ceremonious. First, two chiefs meeting. The junior bends his knees, and places the palms of his hands on the ground on each side of his feet, whilst the senior claps his hands six or seven times. They then change rounds, and then the junior slaps himself, first under the left arm-pit with the right hand, and then under the right arm-pit with the left hand. A chief and commoner meeting do the same, except the second part. Two commoners meeting pat their bellies, then clap hands at each other, and finally shake hands. They keep this up to an unlimited extent, so that the sound of clapping hands is always going on. I hear that a village close to this has been harried to-day by Mirambo; they killed two men and two women, and carried off the cattle. The villagers retreated here. They don't own any cattle in this village, but goats, and fowls, and eggs are plentiful, and I am feeding on the last. The people all want to know what medicine I give the goat, to make her so fond of me. We go on and cross the river the first thing to-morrow morning. I hope there will be no difficulty. I find all the people very friendly, but bitter against the Arabs. I chaff them, and laugh at them when I find a large crowd staring; and they laugh also, and seem to enjoy the fun. They like to have a look, but are not obtrusive, and will go away at once if asked to do so; they are a great deal better behaved than the people would be in an English village, if a black man came travelling about in the same way there.

Scarcely any cloth, most of the people wearing skins. Sambo and small bells common. The hair worn and shaved in all fashions.

Height above the sea, 3284 feet. The River Malagarazi is rather big for one boat, besides which we want the canoes for the donkeys. I make boiling-point 1400 feet higher than Burton says; but there must be some fall towards the Lake. I would give anything for a lunar, but of course the morning is too cloudy. Some of the patterns of tattooing here are wonderfully complicated and pretty; the mother of the Mutwali especially is decorated most extensively. No colouring matter is used, but the patterns are formed of small cuts, like cupping cuts.

Palaver all the afternoon about crossing. An alarm that Mirambo was coming in the evening; he had been near all day. Our informant was a man who had been out in the fields near the village where he lived, and was told by some people who came running away that Mirambo had sacked it. A lot of other fugitives came in. Palaver not finished about Mhongo, as we were interrupted by this alarm. At first, the yarn was that he was coming here. His big brother and one of his sons were killed here four years ago, and since then he has left this part alone till now.

Soon after sunset it came on windy and cloudy, and I could get no sight though I sat up till 4 A.M.

9th.—Palaver again first thing. When one has settled one demand, they bring forward another.

Went down to see the river, about half an hour off, at the ferry; south-west 4 knots; 30 yards wide. No canoes to-day; all having been removed and hidden away, on account of the vicinity of Mirambo. I hear there is an Arab caravan in a village near, from Ujiji, which is afraid to go on account of the row.

10*th*.—Got down to the river, and at first not a canoe was to be seen; but after about ten minutes they came, six in number. Four were long, hollow logs of wood (about 18 feet by 2 feet), and were about the roughest arrangement I have ever seen in the way of boats. The other two were 20 feet long, and even narrower than the others. They were made of a single piece of bark, the ends being sewn up; the gunwales were stiffened with a piece of stick laced to them, and kept apart by other sticks placed athwart the ends, where they were sewn up, sticking up out of the water.

They brought either two or three men and their loads across at each trip, but that was as much as they could do, the water being within 3 or 4 inches of the gunwale.

Sometimes the plain is flooded for about a mile on the left, and for about two or three on the right side of the river; but there are no mounds.

Took so long crossing (from 8 till 1 o'clock), that we were unable to go on, and had to halt at Mpotà, about half an hour (*west*) from stream. Mutwali's Pongera, a small boy, is sick, so I am spared a visit.

A remarkable ring round the sun in the middle of the day, about 35° in diameter, and showing all the colours of the rainbow.

	°	′	″
Obs. for lat. by Canopus	5	09	45
„ by Capella	5	5	30
	10	15	15
	5	7	37

Very difficult to get, as it was misty, and fires were burning all around, filling the air with smoke, and occasionally shooting up flames, which, being reflected in the horizon, put the stars quite out. The mean is only 15″ from Speke.

11*th*.—Got away, and marched west 6 miles. Passed two villages, and halted at a third, Itaka. Received a report of Mirambo having destroyed another village. Eighty men and women killed, and the rest carried off.

Country: jungle, red soil, black mud in bottoms, rolling ground. High rocky hills to the south. Level to north.

12*th*.—Halted for food, and I was seedy, not having had any sleep for some nights. Only news another village destroyed. Ten or twelve people being killed, and most of the rest escaping. Mirambo seems to be pretty active; as far as I can make out, he has only about 150 men with him; so, if the people were to combine, they could thrash him; but, instead of that, they are squabbling among themselves. Have been asleep nearly all day, making up for lost time in that respect, and feel inclined for more. I am very much bothered just now with a plague of small boils on my legs and feet, besides the old big one, which, however, is getting well rapidly; but I am not able to walk much, which is a great bother, as the only donkey I can ride is rather seedy. On the march yesterday. Saw a curious kind of parasite growth on some of the trees. It was only in a little patch, and looked as if gigantic cobwebs had been thrown over them; the people call it Rongi.

13*th*.—Marched about west 5 miles. It was impossible to keep a real course, the path wound so. Passed one large and one small village, and camped at a third.

Several deserted villages, and signs of recent cultivation. Soil, red loam.

Black mud in swamps, and white sand. Several salt places. The people dig the earth, which is salt, and filter water through it, which dissolves the salt out, and then evaporates the water. The curious thing is, that the pools of water in the salt soil are quite fresh. Name of village, Lugwa.

14*th*.—Very seedy last night—a regular touch of fever; so I took an extra dose of quinine, and this morning the fever is gone, but I don't feel particularly bright. Came across two things I did not expect to see before Ujiji. 1st. The water-snuff, mentioned by Burton. Some of the people held on their noses for over five minutes. The first I saw I thought had something the matter with his proboscis; he was holding on to it, and talking at the same time. The other was nyumba, a sort of Jerusalem artichoke, which is very good. The chief, here, has an enormous bird's-nest hut, divided in the inside into two or three rooms. The chief made me a present of a load of salt and some corn, for which I had to give him a barsati.

We marched W.N.W. 5 miles, and then halted. All the country has been lately under cultivation. It threatened rain, and Leo had got adrift, and I had to send men to look for him. One of the Askari also was sick, and I had to leave him at a village just before the camp, and arrange for his being looked after. He ought to be able to come on in a few days. Poor old Leo brought in, and just had time to wag his tail, when he died. Poor old boy, he was all right in the morning. I think he must have been bitten by something, as his tongue and mouth had changed colour, and he was stiff within five minutes after his death. The rain came on almost before we had the tents up. In fact, I took shelter in mine before it was properly pitched. It was thundering and lightning all round for some time before the rain began.

We crossed two little streams, and a good deal of the ground was swampy, black mud; the rest red loam. The village near here is principally supported by the manufacture of salt. The black mud is full of salt, which they wash out and evaporate. The salt is very good and white. People come some way to get the salt earth, which they carry away to their own villages, and conduct the manufacture there. They do so at Ugogo. If it had not been for our halting here at various little delays, we should have made the Rusugi to-day; however, I hope we may cross it to-morrow, and get well past it.

An Unyamwesi mare donkey has been delivered since we came into camp; both she and the foal seem to be doing well. She has carried her load right up, as I did not think she was so near her time.

The country, as we came along, was pretty level, but to the south broke into hills and promontories towards the Malagarazi; and on the right in the distance, the hills of Uhha showed up.

15*th*.—Marched 5 hours W.S.W., and then crossed the Rusugi. Dense jungle all the way till close to the river, which runs down a valley, flanked by small rocky hills. Most of the jungle was young, there having been villages not many years ago. The Rusugi is about 4 yards wide and 4 feet deep, at the deepest, running 3 knots. Some temporary huts on both sides, and numerous broken pots, and stone fireplaces and salt-pits, where the people come to make salt.

We went on for 1½ mile, and then made our camp. If all goes well, we ought to reach the Ruguva to-morrow. The young donkey had to be carried some of the way. We travelled altogether to-day 8 miles W.S.W.

16*th*.—Marched 5¾ hours, 8·5 miles west. Passed ten small streams. All but the last were passed without difficulty; but the last, although narrow, was deep, 4 ft. 6 in. Country, rolling plain, breaking into hills to the north and south. High land a-head and to the southward. Passed many old camps: in one place there were no less than eight, all close together. Much of the land has been under cultivation; the ridges and furrows remaining in evidence of it. Some was thick jungle; other parts, grass or scrub, with occasional trees, and in some places it was sheets of rock. Altogether we were eight hours from camp to camp, including a halt and crossing the last stream. The first part of the day was cloudy, but the sun shone out strongly about eleven, and it was very hot work marching.

I find the last stream is the Ruguva. We heard an elephant blowing in the jungle, but could not get sight of him. Tracks of Mbogo (Bos Caffer) very numerous. Last night had an alarm in the middle of the night, the camp (an old one) was small, and the donkeys were penned in a sort of annex (about 12), there was a row amongst them, and we found that one of them had had a nostril torn by some wild beast, *what*, we could not find out; we moved them all inside.

17*th*.—Marched 5 hours, W. by N., 7·5 miles.

Passed one stream, and camped close to the Masungwe (Unyuwwe, Burton); country same as yesterday. Heavy rain from 8 till 11; rather uncomfortable work in long grass (over head in places when on my donkey). Passed several camps.

18*th*.—Marched 4¾ hours, N.W. by W., 7 miles. Long grass, very wet with dew; legs drenching wet, after about 10 minutes' walking. Passed Masungwe (Masingwe?) (very small); 5 minutes after leaving camp rain came on. Found that several of the men had been stealing beads. I knew it had been going on; to-day we detected seven or eight culprits. Sent two men on to Ujiji to take Said ibn Selim's letters to the people for whom they are intended. It is a nuisance stopping, as we shall not get to Ujiji until the day after to-morrow.

19*th*.—Marched 4 hours, N. by W., 6 miles. Passed a couple of streams going south, after crossing the second I halted, and opened all the loads to see if we could discover any more thieves, but only found one more. First of all the country was the same as yesterday, but after a time we got amongst bamboos, &c., and the country was very much broken into small dips, and the path was rough and full of holes, which made it very tiresome work walking. Passed two more little streams going west (?) just before camping, and a village (Niamtaga), into which we were not allowed to go, and several skulls were stuck on the poles of the boma. The plantations were neatly fenced in with wild bamboo. Our men killed a boa, about 20 ft. 3 in. long, and 2 ft. 4 in. in girth. They say it was big enough to kill and eat goats, and I quite believe it. I find the land road to Kawele is impracticable on account of the rains, the Kuche being very swift and swollen, and the mud very deep. Village named Niamtaga. I hope, to-morrow, to make the acquaintance of the Tanganyika!

20*th*.—One pagazi ran in the night and stole 6 doti belonging to the long Kirangosi (Sadula), and the latter, I find, has sent some men to look for him, and here is a lot of trouble about the loads, and everyone is wanting to stop here to-day, but if I can drive them out, I am going to do it. It is 4 hours to where we have to get into the canoes (which means 5 or 6 hours for all stragglers, &c.), an hour for embarking, 3 for the voyage, and a couple more for disembarking and getting into Kawele, so, most likely, we should not be there till after dark; and if we can shorten the distance to-day, it will be so much the better. Barometer by comparison with last B. P. gives height as 3043 feet, and we are still some distance above Tanganyika with hills between us and it.

I have been obliged to stop, as it has come on to rain hard; but if we could have got away at 6 this morning, as I wanted, we should have had time to camp all right before it came on.

21*st*.—After marching about 2½ hours, I got my first sight of Tanganyika, but it was so cloudy and gloomy that the view was not particularly good; it is, however, a grand sheet of water, and the mountains on the western side seem very fine. After another two hours' march, part of which was over a flat, intersected in every direction by hippopotamus-paths, we arrived at where the canoes where. They are fine large boats, and the men pull instead of paddling; however, the paddles are so short, that the stroke is almost like that of a paddler. Land course W.N.W. An hour and a quarter, N.N.W. (which might be 3½ miles), we arrived at Kawele, where I was received by the Waswahili and Wamrima, who form the trading population here. I find from them that travelling on the other side is impracticable for two months more, so I intend to spend my time in a cruise round the Lake. The shores, as we passed along, were either hidden by grass or formed little cliffs of sand, 15 feet or so high. I had to sit with the head-men till the house they had given me was ready, which delay was rather a purgatory, as I was frantically hungry, and my feet and legs wet from a marsh I had waded through; and when I came to the house it was a miserable affair, and they had put my bed under a sort of verandah, exposed to the gaze of the populace. So I had my tent pitched in a little compound behind. The headman gave a very fine *mat*, and sent me some fruit, custard apples, pomegranates, and sweet limes.

22*nd*.—Bombay and the rest of the caravan arrived. I have got into a fine new Tembe, and am very comfortable. The Soko, or market-place here, is well worth seeing, but I shall reserve my description till I have seen more of it. Arms, &c., of Waguhha and others are all worthy of description, but I want to get all right before I write about them. The fish seem very good, and I enjoyed a fish breakfast and dinner vastly. Mosquitoes are numerous. I find all the Waswahili trade to Manyuema. If there were only some English residents here, it would be a perfectly enjoyable place. Very little fever, and what there is light, not like the Unyanyembe fevers. Of course this is only what I have learned in conversation, but I should think the regular residents were to be trusted on such a subject. Very good bananas here, pomegranates, custard apples, and sweet limes, and the people also eat the fruit of the guinea-palm, tomatoes, yams, sweet-potatoes, pumpkins, cucumbers, and both sorts (black and white) of manioc are amongst the vegetables. Indian corn, rice, and mtama forming the bread stuffs. Cattle mostly of a red colour, a few pied, and some white or cream-coloured. Goats very large and fat, ditto sheep. Fowls and eggs plentiful.

22*nd*.—Employed all day overhauling bales, and find the men have stolen 11 frasilah on the road, besides a load from Sami Sami—a man bolted with it from Ugunda. I have detected about a dozen; I have turned them all off without the remainder of their pay, and from one man, who was paid right up from Unyanyembe here, I have taken a gun.

The Waswahili and Wamrima here are very civil indeed, and to-morrow I am going to Bangwe with some of them on a shooting expedition.

Went to Bangwe. When we had got half-way some of the Arabs decided that it was blowing too hard to go on, and we landed all but one, and were to go back in the canoe. The remaining one, however, took me to Bangwe; as we were leaving we saw the others on the mainland, and they hailed and came off in a small canoe. When they came on board they had a regular magging match, during which we drifted half-way back to Kiwele, and we had to go back to Bangwe, where there was a general reconciliation and shaking of hands. I saw a few kingfishers, and a sort of diver, a kind of cormorant, and a fish-hawk. We caught no fish, though I had a minnow trolling all the way.

The sun was very hot and trying, and I was regularly overcome by it, by the time we came back. We started at 10.30 A.M. and got back at 5 P.M.

26*th*.—Yesterday received Dr. Livingstone's stores; wrote home, and to Dr. Kirk, and was busy about Journal. The same to-day, and paying pagazi.

. With regard to Lieut. Cameron's observations for the height of the lake-level of Tanganyika, the Society, having retained the certified "Index Errors" of the instruments used by him (which were ascertained at the Kew Observatory and at the Royal Geographical Society), will thus render these observations the most complete that have ever been made either on or near these African lakes.

On February 27th, 1874.—7 A.M., at Ujiji, seven boiling-point thermometers[*] were used, which, corrected for index error, gave the mean result as 207·54°; the corresponding barometric reading is 27·36 inches, temperature 82·2°.

On February 28th, 1874.—7.30 A.M., at the same place, two of Capt. George's Mercurial Barometers,[†] filled on the spot, gave a mean of 27·35°, temperature 74°. With the above data, using the barometric sea-level of 29·92 inches,[‡] and the coast temperature for February, and the same latitude of Ujiji as given by Dové, the result of computation is as follows:—

February 27th, 1874.—Lake Tanganyika, Ujiji, 7 B.P. thermometers give	2595·2 feet.
February 28th, 1874—Lake Tanganyika, Ujiji, 2 Capt. George's Mercurial Barometers	2711·2 feet.

The first part of Lieut. Cameron's journal not having come to hand, the result of the four aneroids is not attainable, on account of their having been re-numbered at Kasé, and the former numbers omitted.

4. *On the Reconnaissance of a new or partially known Country.* By

CAPTAIN C. WARREN, R.E., F.R.G.S.[§]

THE system to be adopted in the reconnaissance of a new or partially-known country must, in a great measure, depend on the time allowed, the attitude (friendly or otherwise) assumed by the inhabitants, and the means (whether of instruments, labour, or money) at the disposal of the surveyor: it being assumed that the object of all topographical surveys is that of obtaining as faithful a representation of the ground as is consistent with the conditions above stated.

As the strength of a fortress lies in its weakest point, so the merits of a finished survey must be gauged by that part of its construction which is least perfect in comparison with the rest: it is, therefore, evident that the whole subject should be so well thought over before commencing, that it may all be brought up to the same standard of perfection as regards triangulation, observations, hill-sketching, plotting, contouring, &c. If any part is to be relatively more perfect than the rest, it should be the basis on which the survey rests; because it would then be possible at a future day to bring it all up to the same standard by doing the remainder over again. It is obviously absurd to spend time in the field in elaborate hill-sketches, if, on being plotted on the plan, they are to be squeezed in in some places and expanded in others, to fit an imperfect triangulation.

The basis of an accurate survey of a tract of land being necessarily an extended system of triangulation, forming a framework to be subsequently covered with the features of the country, the first point to be decided upon previous to commencing is the amount of general accuracy required throughout. It is apparent that, however gratifying it may be to the surveyor, who naturally prefers to produce good work, it would be seldom necessary, except under very exceptional circumstances, to attempt the rigidly accurate system adopted in the Survey of the United Kingdom, where the money spent is but a percentage of the money saved the country in preventing litigation and in escaping errors in projects for engineering works, &c. On the other hand, it must be recollected that the absolutely unknown portions of the globe are becoming so rapidly circumscribed, that there are few portions of the earth's surface of which some rough plan does not already exist, either made up at a distance from the accounts of natives who can describe the places, their relative positions and distances by hours one from the other, or else, perhaps, constructed from itineraries, surveys by the eye, or roughly by compass.

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[*] All by Casella.

[†] Made by Gould and Porter.

[‡] In all previous observations this sea-level has been used.

[§] Read before the Geographical Section of the British Association, at Belfast, August, 1874.

This being the case, it is of little service that the modern traveller should commence operations in these parts on the same system, or with the same inferior instruments as his predecessors; for, in so doing, he would neither be able to add to what has been done before, nor even to substitute for it his own work. His new plan, if made independently, would certainly differ from the previous one; and however much confidence he might have in it himself, the geographers, knowing the system on which both were executed, would be in the awkward dilemma of having to choose between two equally incorrect plans, each exaggerating the errors of the other, and both equally wanting in merit.

It becomes therefore necessary, under these circumstances, to adopt some system of surveying which, while allowing of a rapid triangulation and sketching in of the ground at one time as the party moves along, is a step in advance of the system formerly adopted: and in doing so it is not only necessary that it should be more perfect than before, but the traveller also must be provided with better instruments; and, above all, he should be properly instructed in their general use to such an extent as to have sufficient knowledge to be able to use them under the manifold adverse circumstances which crop up on every side during the progress of a rapid reconnaissance.

It should be remembered that Trigonometrical Surveying is a profession, a branch of scientific education, which can seldom be taught in after life except by the experience of repeated failures; and that though a reconnaissance of a district is but a rough form of surveying, yet it in many ways taxes the thorough knowledge and experience of the surveyor to a very great extent, it being necessary that he should be constantly prepared to rapidly decide on courses of action adapted to the changing circumstances under which he may find himself placed, to such an extent that he must be very surely grounded in the subject to carry the matter through. The knowledge to be derived from text-books on reconnaissance is just sufficiently superficial to land a man who trusts to them in difficulties, which no energy or will on his part can remedy, in a survey of the nature now under discussion.

The advantages of a knowledge of making a reconnaissance have been so fully recognised in modern armies, that every officer is now more or less superficially instructed; but the very great difference in the degree of knowledge required in the several kinds of reconnaissance does not appear to be sufficiently recognised, and there has been rather a tendency lately to withdraw this work in the field altogether out of the hands of the scientific branches, although it is evident that it is now more necessary than ever, on account of the change in modern warfare, that the military surveys of districts, tracts of country, future campaigning-grounds, should be entrusted to those with whom this work has been familiar from boyhood, and who are able to reproduce the features of the ground on plans most accurately, in the least possible time, and at the cheapest cost. A general's success in the field may depend much upon his knowledge of the ground gained from plans, and unless those plans are constructed by surveyors of experience, they are likely to fail in parts, and may be instrumental in the defeat of an army.

A few words on the gravest fault an inexperienced surveyor can commit, which renders the most beautifully got up plans worthless, viz., that of filling in on the plan features, hills, marshes, &c., by guess, in parts of the country not visited, in order to give the map an equal appearance.

As a general rule, and one which cannot be too rigidly carried out, nothing should be shown on the survey-plan which has not been seen and fixed. If a river is crossed at one point, and then again at some distance off, the continuation not being visible, should the natives say it is one and the same river, it is not right that the surveyor should join the two points with a firm line, unless he actually goes to see that their information is correct; he should be contented with showing the continuation in dotted lines or arrows. Again, it may be apparent that between two parts examined there is nothing but a succession of barren hills; nothing should induce the surveyor to put in fancy sketches of these hills: he should show only what he can see, and write across the remainder, "hills not visited," or words to that effect.

It may often happen that among these bleak hills there are fertile plains, good roads, populous towns, and waterways. If this matter be not attended to at the onset, the surveyor will insensibly assume a shuffling method of surveying, doing portions accurately, and slurring over other parts; than which no system can be more vicious, because it deceives. The experienced surveyor, accustomed to more accurate styles of surveying, knows and loves his work too well to fall into these errors.

To return to the system to be adopted in this rapid survey. In a Trigonometrical Survey the triangles are first observed and calculated throughout, then subdivided into minor triangles, cut up into portions, and surveyed in detail with chain. This system is quite out of the question in the present case. There is also another method, quicker and less accurate, of piling the triangles one on the other as you proceed, and working inside with theodolite and chain; this also involves accurate observing and calculating, and is too slow for our purpose.

The system recommended for a district survey (scale one mile to the inch or under) is that which has been adopted in various degrees in some recent surveys, viz., a *quasi*-triangulation, consisting of true bearings with a theodolite from certain stations to others, forming a network of triangles, the whole checked and fixed by astronomical observations for latitude from the same stations. By this method any errors which might be produced in this rough system of triangulation are constantly checked by astronomical bases, so that the stations generally are fixed one from the other to about 100 yards of their correct position on the earth's surface. The interior work being sketched in by aid of the prismatic compass from day to day as the triangulation progresses; many of the points within the triangles being also fixed by bearings from the stations with theodolite. The process will be described in detail further on.

Now with regard to the scale to be adopted in this survey, it has been stated above that, in the system proposed, the stations can be fixed to 100 yards of their true position on the earth's surface. On the scale of ½-inch to the mile, a broad stroke of a pencil will cover about one-fortieth of an inch, representing about 100 yards, or the amount of error within which the principal stations will lie. In short, the stations would be fixed on plan to within the limit of accuracy of which the drawing-pencil is capable when used in the field.

The scale of 1 inch to a mile is that generally recommended to be used in the field, in a survey of a district, and it has much to be said in its favour for a triangulated or measured survey, but it will be found somewhat too large for a rapid reconnaissance survey—the largest sketching-case in ordinary use only holding a card, on which the tracing-paper is fastened, about 12 inches by 15 inches, representing on the inch scale as many miles; and as the surveyor will travel over more than this portion during the day, he will not only be frequently riding out of his sketch-sheet, and losing time in changing it or altering the position of paper on the card, but he will also find that many of the points on which he will depend are out of the sheet, and he will either have to do without them or else lose much time in getting over the difficulty. By the use of the scale of ½-inch to the mile, he will obtain on his card a portion of ground 24 miles by 30 miles, in which he can work for several hours, with most of his points for observing to within the card: for it is to be remarked that, as an error of 1° will in 6 or 7 miles give an error of ·05 inch, or 200 yards on the scale of half-an-inch to a mile, it will not be desirable during the day's work to take bearings with the compass to points more than this distance from the observer; the accuracy of the prismatic compass, owing to the personal equation, magnetic variation, and generally undefined appearance of objects observed to, being seldom to be depended upon to within one degree, although the observer may note down to quarter degrees.

As the whole of the survey within the triangle, both as regards accuracy and rapidity, is dependent upon every artificial obstacle in the way of the field sketcher being removed, it is evident, from what has already been said, that the ½-inch scale is very much to be preferred for the work in hand.

In cases, however, where there is some reason for a different scale being used on the fair plan, it is still recommended that a scale somewhat akin to the ½-inch scale may be used in the field, and that the scale be enlarged or reduced on the fair plan in camp. Should, however, there be nothing against it, it is recommended that the fair plan be plotted also on the ½-inch scale, and a reduction to 10 miles to the inch be also made, for the purpose of sending home, should it not be convenient to send the more bulky fair sheet.

The selection of a projection to which the work is to be referred is a matter dependent on latitude and local peculiarities, and is a subject which would be decided upon and communicated to the surveyor as one of his directions, and not left to his discretion.

The instruments recommended to be used are:—

For the triangulation, *a 6-inch diameter transit theodolite.* This will not only give very good results in taking rounds of angles, both horizontal and vertical, but also can be used for obtaining time and longitude by method of zenith distances or by meridional transit: it can also be used for latitude and azimuth observations.

It should be provided with a pair of micrometers in the eye-piece of the telescope, for the purpose of measuring small angles, such as those subtended by a pole of known length, so that distances across a ravine or river may be measured, or a traverse carried through a country.

To supplement the above, a range-finder may be added; by which, with a base of 40 to 50 yards, points from 4000 to 5000 yards distant may be obtained, with tolerable accuracy, from isolated fixed points. Thus, should you arrive on the extreme boundary of the district you are able to survey, or at the bank of a river, or on a mountain-ridge, you may fix a considerable number of points beyond from your station, by taking the range and a bearing. The French range-finder, by Col. Gaulier, admits of great rapidity of action, and is carried in a portable case about 5 inches cube.

A 6-inch sextant and mercurial horizon for observations for latitude and time, and occasionally for longitudes; also a lantern.

A 3-inch pocket-sextant to supplement the above.

A silver lever watch, with plate-glass front.

A prismatic compass, in case, with sling, spare glasses, and pivot; also two pocket compasses.

Three pocket-aneroids, furnished with sliding scales.

Two pocket-chronometers.

Two hypsometers and a standard thermometer; also a wet- and dry-bulb thermometer, in case.

A large and a small sketching-case, roll of tracing-paper, block of paper for sketches of landscape.

Case of mathematical instruments.

Pocket-level. This will be found most useful (in making small special surveys) for contouring and for exploring underground.

Telescope for observations of Jupiter's satellites, &c.

Mapping instruments, stationery, and books.

Above are enumerated the more important instruments required. The number of spare and additional instruments would be settled on according to circumstances; as would also the stationery and books.

Let us now examine into the system proposed over a tract of country, say about 200 miles square, made up of barren and wooded hills, marshes, jungles, sand-tracts, and sheets of water. Our first endeavour, on commencing work, will be to fix in this tract some one point (A) accurately on the earth's surface, to which the remainder of the work may be referred. Should our district be near the sea-coast, we can readily do this by selecting some spot thereon of which the position is known either from the Admiralty Charts or otherwise obtaining from the Royal Navy, and connecting it with our point, which we will call A, by triangulation, or traverse, or by signalling-rockets; such signals may be fired with charges of powder to explode in the air, or gunpowder flashed in metal pans,—the flashes from these have been observed at 40 miles' distance.

Should the point A lie nearly north or south of the known spot, we may carry a line or lines over the country by observing for latitudes and taking true bearings.

Let us suppose, however, a more extreme case: when our district lies 600 or 800 miles away to the east of any known point, "Why not carry Greenwich time there," it may be asked, "as the sailor does from port to port?" But here lies the difficulty: chronometers, which travel well by sea, cannot be trusted on land-journeys on the rough roads they would necessarily have to be carried over; the jolting, the alteration of atmospheric pressure and extremes of temperature, all conduce towards changing the rates of the instruments and render their records untrustworthy, while a fall might injure them beyond repair.

There only remain, then, two methods (unless there should happen to be a waterway): either we must run a traverse through, which would delay our journey too much, or else we may get an approximate approach to the difference of longitude by the means of some (3 or 4) pocket chronometers.

As, however, the action of the pocket-chronometers will be uncertain, we are practically reduced in this case to fixing the point A on the earth's surface by astronomical observation from itself. Let us see how nearly we can manage this. It has already been stated that latitude can be taken with accuracy with 6-inch sextant to 100 yards on the earth's surface; this process will hereafter be described. Could longitude be also obtained as accurately, surveying in a wild country would be shorn of half its difficulties; but, under ordinary circumstances, longitude of a place cannot be found within 10 minutes (10 miles on the equator) of the truth by lunar distances, and the process is a very laborious one when there is only one observer, there being three elements required as data, which, if not obtained simultaneously, must be reduced to what they would have been at the same moment.

By the method of zenith distances with 6-inch transit theodolite the longitude can probably be obtained somewhat more closely; but even by this method, after observations extending over four hours, it is considered a fair result if it is within 8 miles of the truth. It is thus apparent that observations for longitude, of the nature described, can be of no use whatever in surveying the district itself, and would only be used in giving the survey generally a place on the earth's surface.

In spite of the uncertainty which hangs over the taking of longitude in this way, it is desirable to accept the results, modified perhaps by those given by the pocket-chronometers, and look upon the position of point A as settled, until some opportunity occurs of observing an occultation of a fixed star by the moon, or an eclipse of one of Jupiter's satellites, at some station during the progress of the survey. The surveyor should constantly bear it in mind, to be ready to take advantage of any such occurrences, as they give the longitude with great accuracy, and by referring it back to the point A the whole district can be corrected east or west to its right position.

An error of one *second of time* in a lunar zenith distance will produce at least 30 seconds of time error in longitude; while an error of one second of time in an occultation, or an eclipse of Jupiter's satellites, produces an error of only one second of time in the longitude.

We have now arrived in the district we are about to survey, and, taking up our encampment at the point A, we prepare for observing angles from a prominent hill hard by. Having made some preliminary inquiries, we proceed shortly before sunset with our theodolite to the top of the hill, accompanied by a native who knows the country; and selecting a good referring object, about which we should always be particular, we take rounds of angles on two or three arcs to all the prominent points observable. Should we commence too near sunset, we shall have a difficulty in distinguishing all the objects, and shall have to return in the morning, when the lights are different. The surveyor soon recognises the best light for observing in each climate, and the peculiar effects of the sun at different hours of the day, by which objects at one hour are quite invisible and at another are among the most prominent in view. Having completed the round and taken angles of elevation and depression for altitude to many of the points, a bearing should also be taken to the camp and its distance computed by the micrometer attached to the telescope, so that the latitude obtained at the camp may be transferred to the trigonometrical station.

The angle made by the compass attached to the theodolite with the referring object is also recorded.

Should the district be in the northern hemisphere, not very close to the equator, the telescope is now set as near as possible, time and latitude being assumed, upon *α Polaris*, which will be visible in the field of the telescope many minutes before it can be seen with the naked eye about sunset time: when it is seen, the cross wires are laid on it, and time, bearing, and elevation are recorded. This time must be compared in evening with the time observed, or with the chronometers, so as to correct the position of star to the true meridian: this can be readily done by using the first table in the 'Nautical Almanack' for finding the latitude by Pole Star, altering the times by six hours so as to make use of the angles of altitude as azimuths. In some portion of the northern and in the southern hemisphere, it will be necessary to observe a circumpolar star at its greatest elongation, or, failing this method, to calculate the amplitude of the sun at his rising or setting for any day to the assumed latitude, and comparing it with his observed bearing when he is 34 minutes, or about his own diameter, above the horizon, as his disc is elevated that amount above its true place by refraction.

At the time of observing to the several points, their names should be ascertained, and written down phonetically, if the observer does not know the language, a sufficient space being left for the insertion of the corrected names when they shall be obtained.

We now return to the camp, which should be placed in as healthy a spot as circumstances will admit of, having a due regard to the observing of stars.

We have next to make all inquiries as to the surrounding country, especially that to be sketched in the morning, receive the deputations from the villages about, do any of the bargaining that may be necessary, and take in food for the prosecution of the night-work.

This work will generally consist of six observations of east and six of west stars for time, six or more observations of *a Polaris* or a circumpolar star, and ten or twelve of a circum-meridian altitude for latitude. The time of observations will much depend upon circumstances; they often have to extend over several hours, but at certain times of the year in some latitudes they can be all got over in 1½ or 2 hours. The observations themselves only take a few minutes. The method pursued will be described. The time of observation may probably be found convenient from 9 P.M. to 10.30 P.M. It is now necessary to buckle to and calculate these observations roughly, for which purpose all materials should have been left out previously and found ready on return to the tent, in order that the observer, tired with his day's work, may have no excuse for turning in regardless of his wants on the morrow. The time and latitude being both unknown, the first calculations are only approximate, but they will probably be sufficiently close for the purpose required; if not, they must be worked over again with the corrected observations. As this is the first day's observation, nothing further can be done beyond plotting the position of A on the fair plan; the surveyor, having made up his journal and walked round the camp, can now go to bed. If he is in a malarious district, he will do well to sleep under a moscheto-net, which appears to have the property of keeping the malarious gases outside it.

At early dawn the surveyor will do well to go up again to top of hill with his theodolite, and go over the round of observations afresh: he will probably see many objects which on the previous evening had escaped his notice. In some climates there are times of the day when the mists of the earth are drawn aside, as though they were a veil; this should be noticed and taken advantage of. Again, there are times when the parallax, owing to excessive heat, is so great that observations of points near the general surface of the earth are useless.

The surveyor—having as yet no astronomical base to commence on—can, with his range-finder or micrometer, combined with the true bearings, fix a certain number of points in the direction he is going to take: he now sets off with his sketching-case and prismatic compass, and, gradually circling round, at the end of the day's work arrives at camp near a hill about 10 miles north or south from the point A; here he will again take a round of angles, observations for true meridian, magnetic error, and in evening for latitude and time. He will now be able to lay down on his fair plan the latitude of this new station, B, and its true bearing from A, by which it will be fixed. He can now also, from the points A and B, lay down all other points observed from both these two, and can also make use of his compass-bearings, and lay down the hill-sketching. He will also, in preparation for the following morning, transfer to his sketch-sheet all the fixed points he can want, having previously determined the direction he will proceed in, which may be somewhat either to the east or west of the point B, so that C may form a triangle with them: if this can be done, he may carry a system of triangles with all their angles observed, right up the country, the points being about 10 miles apart; of course the nature of the country will settle this. Should there be a line of hills running *generally* north and south, he cannot do better than follow them through the district, and, when completed, bring down another system of triangles on one side, and so run up and down the country laying on one line of triangles after another until all the work is filled in. The great advantage to be derived from taking the hills first is that, afterwards, in low-lying ground it may be difficult to observe to any distinguishable point within some miles; whereas, if the hills can be seen, observation to two or more known points 20 or 30 miles distant, will securely fix the observer's position, to be checked also by the latitude.

The surveyor must, if possible, obtain some datum in his district for altitudes. The mountain barometer is too delicate an instrument to take across country, it seldom travels far without breaking; there is a new patent standard mercurial barometer by Casella, which is said to stand travelling and to give good results, but these do not appear to have been as yet published. If he has no means of obtaining a correct altitude, either by mercurial barometer or by angles of elevation or depression for a known point, he must take a mean of several observations with his aneroids and hypsometers, and from these results assume a height for his camp A, to which his observations may be referred.

The observations of aneroids are good for differential heights, but are not reliable for absolute ones. From the survey of Sinai, by Major Wilson and Captain Palmer, R.E., the results of the systematic use of the aneroids and hypsometers show (1), that at high altitudes hypsometers are not to be depended on for any but the roughest approximations; (2) that aneroids are, *per se*, almost worthless for absolute determinations, and are only of use when used in direct connection with standard mercurial barometers at various heights.

It is thus evident that the surveyor must not spend too much time in making delicate corrections on observations given by instruments bearing such bad characters. The simplest method will be to have a sliding scale of feet attached to the outer portion of the scale of inches on the aneroid: this can be altered each day, according to the rise and fall of the barometer; and when observations are taken, the corresponding altitude can be noted at the same time, which will give a near approach to the approximate height—it is very desirable that two aneroids should be noted together, to check each other. It may be mentioned that the simultaneous observation of aneroids, up or down a hill, the back aneroid taking the place of the forward one at each change of station, is a very correct method of levelling.

The surveyor, on leaving camp on his day's sketching, should be careful to note the time and reading of barometer; he should note the time of stopping and starting again from each halt, observing also the aneroid: thus he forms a complete itinerary of time, bearings, and altitudes, and with these alone a route-survey could be constructed if necessary, the rate of travelling being known. The compass bearings should be always noted: it is not sufficient to plot them alone, as is sometimes done, on a plane-table.

The books to be used are:—

A note-book for the itinerary, times of halts, compass bearings, aneroid observations, heat of springs, and all remarks. If properly ruled, this book may be kept very neat. It is not desirable to multiply books; this note-book, the sketching-case, and the block of sketching paper, are all that need be used in the field.

In the camp, and moving with the luggage, is the observation book, containing, at one end, the theodolite angles, azimuth, and magnetic bearings; at the other end, the observations for latitude, time, comparison of chronometers, &c.

There is, besides this, a meteorological register of temperature and barometric readings in camp, at certain hours.

A register of names met with, and remarks; a journal of proceedings, description of country, with little illustrative ink-sketches, it possible; and a rough scribbling-book, in which all the observations can be worked out.

The sketching-case contains pencil, india-rubber, protractor, and spare paper.

The surveyor should not forget that a few, even of the roughest, sketches may serve to illustrate costumes, scenery, customs, &c., more truly than pages of word-painting, and he will do well (if he does not photograph) to make outline sketches of the hills from various points of view.

The style of hill-sketching is a matter of taste, unless there are several surveyors working over adjoining districts, when, of course, it should be arranged that everything should be in unison. If on the scale of 2 miles to the inch, probably the horizontal system of hill-shading is preferable to the vertical, the latter on a small scale giving all the bottoms of valleys a very angular appearance, and it does not afford quite so much facility for showing the features, rocks, &c. In penning in on the fair sheet, it is suggested that all the hill-shading should be in sepia, so that the printing, trees, houses, &c., should shew up above it and thus diminish confusion.

Use of the Sextant.—The greatest care should be taken in selecting this instrument, as the accuracy of the survey depends, in a great measure, upon it. See that it is all well fitted together, and that there is no jolting or unsteadiness in any part. There should be no refraction in the reflectors. In observing, it is desirable to settle beforehand what stars are available: a rough list, corrected from day to day, will be found very useful; on this can be inserted the time a few east and west stars are on the *prime vertical*, and the hours of culmination of those that can be used for observing to.

The pocket-chronometer should be used at these observations, on account of its more measured and louder beat.

A convenient point is selected near the camp, where there is no danger of the observer being disordered, during his observations, by an inroad of strange animals: it should be well trampled down smooth, and should not be overshadowed by trees or rocks, and tall brushwood near should be broken down. A carpet, about four feet square, is now spread out, and about the centre is placed the artificial horizon, the quicksilver having been strained into the clean trough through a piece of chamois leather. If the night is calm, the glass cover may be removed; but, as a breath of air disturbs the surface, it is seldom it can be dispensed with except in the tropics. Boggy ground will keep the mercury in a tremor, so will also the stamping of horses or dancing of natives, if very near. The surveyor may choose his attitude; for a young man, the sitting cross-legged, tailor fashion, is recommended, as it secures very steady and rapid results, but is cruel work for the spine and thighs if the observations extend over two hours, as they sometimes may. The observer sits down opposite the mercury, and arranges himself so that when his head is bent down he can see the reflected image: on his right is the sextant box, and in it the box of the artificial horizon; on this is placed the chronometer, propped up towards the observer, and facing it is the lamp, throwing its light to the right front so as not to dazzle the observer's vision. The observation book is ready, ruled, and open at the proper page; if an assistant can be impressed into the work, who can jot down the observations correctly, so much the better. The observer first tries for index error, by bringing the image and reflection of any star into contact, and noting the amount of error on the arc, or on the arc of excess, noting also whether the error is plus or minus. He now, with the index at zero, directs the telescope of the sextant upon the star in the heavens, and swiftly, by turning the index arm and moving the instrument at the same time, brings down the reflected image of the star until it coincides with the image in the mercury, seen directly through the unsilvered portion of the horizon glass; this becomes in practice quite a mechanical process. If the star is east or west he can let it make its own contact, that being a more certain method; if it is a star at its culmination, he can make contact, with the reflected image or that from the surface of the mercury being alternately uppermost; by this latter arangement doing away with all personal error. At the moment of making contact his ear must catch the beat of the chronometer (making five beats to two seconds), and he will, while bringing down his sextant and bringing his eye on the chronometer, count ten beats, and note the minutes and seconds at the tenth beat. This all becomes so much a matter of routine that it gives no trouble. The times of observation are thus all noted ten beats or four seconds beyond the real time; and no notice of this is taken until after the mean of all the observations is worked out, when the four seconds are subtracted. The observations are taken and noted as fast as is consistent with accuracy; the rapidity will differ considerably, not only on account of clouds, mists, &c., but also with the health of the observer: hand and eye cannot always act closely in concert, if the mind is strained or the body wearied with undue labour, and the observer must learn to see with equanimity that his best efforts cannot always bring about good results. The *instrumental errors* due to imperfections in the make of the instrument are a constant source of vexation, as they make the best observations appear in error; but if attention be paid, so that the stars on either side are about equal in altitude, all errors of the instruments are eliminated by obtaining a mean: so also is that introduced by the interposition of the glass cover over the mercury.

The observations should be worked out on a set form; that used in the Palestine Reconnaissance is recommended, passed on to me by Lieut. Anderson, R.E.

Perhaps a few words on the reconnaissance survey of the country to east of Jordan may serve to illustrate some of the points mentioned. In 1867, when I examined it, it was but little known: visited it had been by a few distinguished travellers along certain main paths, but the general features had not been sketched; and even Van de Velde's map, which at that time was the least imperfect of all, was hopelessly inaccurate—it did not even pretend to accuracy in these parts, being constructed, as he frankly informs us, from the itineraries of Burkhardt and others, and from information obtained from natives while visiting Jerusalem. Under these circumstances but little reliance could be placed upon it, giving, as it did, only an idea of what the country might be, whilst we wanted a sketch of what the country was.

The Syrian climate is said to be one of the worst in the world; and certain it is, whether from undue exposure, malarious influences, or other causes, a considerable percentage of travellers in Palestine either suffer whilst in the country itself, or else carry back with them the seeds of illness, which develop often into lingering complaints. For my own part, during three and a half years it was my lot to serve in the Holy Land, I found health when encamped in the open, and sickness when housed in the towns, especially Jerusalem; and I hailed with gladness the prospect of a month's reconnaissance of the hills of Gilead and plains of Moab, during that portion of the year when the fervid heat of the Syrian sun begins to influence all nature, reminding us forcibly of the sentence pronounced against Israel for disobedience, "and thy heaven that is over thy head shall be brass, and the earth that is under thee iron."

The climate of Palestine differs in a great degree from that of the countries lying in the same latitude: it possesses a climate peculiarly its own, for, being a fringe to the great Arabian desert, it is influenced, to a great extent, by winds from that quarter, which, carrying fine sand, and destitute of ozone, irritate the nerves of the inhabitants, and even colour yellow the city walls on the side exposed to them.

The country is itself one of the most remarkable features on the face of the globe, possessing as it does that singular River Jordan, "the Descender," which, rising at the foot of Hermon, about the level of the ocean, flows through the depressed plain, separating the hill-country of Galilee and Judea from that of Bashan and Gilead, and, after passing through the fresh waters of Tiberias, at a depression of 600 feet, finally flows into the Asphaltites, or Dead Sea, a sheet of acrid salt water, lying at a level of about 1300 feet below the surface-waters of the globe; a sea which, fed by the Jordan and other smaller rivers, finds its only outlet in the rapid evaporation caused by the passage over it of the dry desert winds; and as these do not coincide with the times of the Jordan freshets, a periodical rise and fall in the height of the sea is caused; so that, probably, in one year there may be differences in level of 10 feet.

From the varied nature of the country, the mountainous tracts and depressed plains, the scorching winds of Arabia, the snows of Libanus and tropical climate about the Dead Sea, it has been observed that there is no other district on the face of the earth possessing so many climates, and, it might be added, no other where the alternations are so rapid and trying. The portion of country to be examined at this season of the year (July and August) is that part of the eastern side of Judæa lying between the ancient Jerasa and the northern end of the Dead Sea, and from the Jordan on the west along the depressed plain (sometimes called Moab) to the east, mounting up to the plateau of Arabia, beyond Rabath Aman, some 4000 feet above the Dead Sea, the country between consisting of narrow ravines, hanging-woods, rich pastures, and barren hills; forming that country which, with its many springs of water, so pleased the children of Reuben and Gad, that they preferred to take it as their lot, instead of inheriting in the Promised Land to the west of Jordan—a piece of country about 40 miles by 25. Here, in the middle of summer, we were occupied for a month making reconnaissance-sketches, special surveys of towns and ruins, photographing, collecting names, and examining ruins; all day out in the sun, and devoting much of the night to observing and putting the day-work in order. We were accompanied by a band of Bedouin of the Adwân, lately outlawed by the Turkish Government, with whom they were at war; and these men were constantly debating whether it were the better policy to be true or to play us false. It was necessary to be continually humouring them, either in their fits of enthusiasm at gaining a victory when they thought they were a match for all the world, or in their hours of depression when they heard that the Turks were quietly pressing on and gradually hemming in their tribe. They were in a peculiar position, for they had made their bargain with me when they thought that the Turks did not really intend to advance against them; and now they were unable to settle how they ought to act, between their desire to join the fighting and to keep to their bargain, the wish to pocket the money and their desire to protect their granaries, and their fear that they might fall into the hands of the Turks when acting as my guide.

They have a strong idea of the personal influence of an Englishman, and whilst they acted as my protector in their country they looked upon me as their protector, should we suddenly find ourselves surrounded by the Turks, and tried hard to extract a promise from me, *on the word of an Englishman* (a common form in Syria), that they should not suffer if caught while in my service. This, of course, it was quite out of my power to give, and as the sheikh Goblan, the chief of the band, had a great number of uncondoned murders still on his hands, which left him in jeopardy of his life, I urged him strongly to take every precaution as to his own safety, and at the same time asserted my right under the agreement to go as near to the Turkish army as my work might carry me. The result of this was that we were sometimes left alone between the two armies, not knowing in the least whether we should not have to defend our own lives against either party should we get into the thick of a skirmish. At one time we were within four hours of the Turkish army, their scouts being close on to us: we were deserted by the Bedouin, and were able to do a good day's work in Jerash in quietness. On that day, when climbing a hill, I came upon one of our Adwân acting as a scout, and passing signals from hill to hill as to the movements of the enemy, it being the desire to lure them into the tangled woods about the River Jabbok, and there to slaughter them in detail. The Turks, however, were much too wary for this; they advanced by easy stages, keeping all together, building block-houses at each halting-place, putting in a fair garrison, and supplying it with corn plundered from the Bedouin granaries hard by, for they had the luck to be accompanied by one of the Adwân who had gone over to the Turks owing to some family quarrel, and who was able to point out all the granaries, without which assistance it would have been very difficult for them to have advanced. Between Jerash and Es Salt there are a few villages, and these were now deserted, the inhabitants having removed their children and chattels into the rocky, wooded ground to the north of Jabbok: there, lying out in the open, we came upon them, when going up for some observations, and saw them quickly scatter among the foliage, they thinking we were the abhorred Turks. We found the town of Es Salt (Ramoth Gilead) in the greatest state of ferment: a little republic at that time, it still was a city of refuge, as it had been in the time of the Israelites, and still contained many that were unfortunate and vile. These people, who generally looked upon the Bedouin as their greatest enemy, now fraternised with them, and even allowed them to remain under the walls of their city, and joined with them in the common cause: for the coming of the Turk was, to most of them, a change from affluence and freedom to serfdom and poverty. At the time we came into the city on one side, scouts came running in at the other announcing the approach of the Turkish army; off galloped the Bedouin cavalry, followed by the braver fellahîn as skirmishers, the more sober-minded remaining behind to take care of the town. The Turks, however, were only reconnoitring in force; they soon retired, and did not take the city for some days after. While there, a deputation of Arabs, Anglican Protestants, called upon me, stating that they had no recognised head to intercede for them, as had the Greeks and Latins, and they were in fear that their property would be confiscated. I willingly wrote a letter on their behalf to the Governor-General of Syria, who was with the army, asking him to take them under his protection when he entered the city; and it was pleasing to hear, from a letter they wrote shortly after, that he had befriended them. All this uncertainty was very hostile to the taking of an accurate survey; and it was not only the Turkish troops that gave our guides uneasiness, for my sheikh Goblan, besides his tribal quarrels, had personal feuds all over the country; so that, whenever we came on the outskirts of the Adwân territory, the precautions he took were quite ludicrous—sleeping in a sitting posture with his drawn sword in hand at the door of my tent.

In addition to these disturbing elements, I had started off on our work with a non-commissioned officer who was suffering acutely from dysentery, so that he was unfit to travel; but having made up his mind that his only chance lay in keeping with us, I took the risk, and though for a time we were uncertain, from day to day, whether we should not lose him, the change gradually affected him favourably, and the disease left him.

The heat in the depressed plain, during this tour, was considerable, the greatest heat registered in the shade was 110° F. after sunset, but in one day in a previous month the thermometer stood at 117° F. in a cave; this was during a very dry east wind. It was impossible, in the low country, to remain in the tent after sunrise, the heat rising at once to 104° F., and keeping at that temperature all day. I noticed that 104° F. was a very usual point for the temperature to stand at, apparently there being some compensating influence brought to bear on any tendency to rise higher. This was a height to which it constantly rose in Jerusalem, in the afternoon in shade, during summer months.

This portion of Palestine is owned by the Adwân Bedouin, who are, for the most part, horsemen: those, however, who do not possess horses hope to do so, and will not do any manual labour, but they allow certain tribes of black fellahîn, who also live in tents, to till those portions of the ground that will bear cultivation; these labourers are also constantly recruited by the numerous deserters who arrive across the Jordan from Jerusalem, Nablous, &c. The general arrangement is that the fellahîn shall hand over to the Bedouin one-half of the produce of the ground; on the other hand, the fellahîn look to them, in return, for protection. There are also a few villages, besides Es Salt, inhabited by fellahîn, both Mahometan and Christian: these used to be more numerous formerly, but the Bedouin had gradually driven the inhabitants out of the smaller villages at the time of our survey.

Before commencing the survey of this country, I had already surveyed the eastern banks of Jordan up to the hill country, joining on to Lieut. Anderson's survey, but I had failed to connect the plain with the hills to my entire satisfaction, on account of the peculiarity of the ground. I was therefore anxious to fix the eastern hills from those on the west, and then those in the plain; the points on the east of Jordan from the western hills, and those on the west from the eastern hills.

Thus, in my new work, the former work would be of little use to me except in the commencement of sketch-sheets; and as my only well-fixed points were Olivet and Gerizim, I was obliged to commence the survey on its own basis, connecting it afterwards with the western side, as I travelled on, and was able to get good bearings to my fixed points. The scale used was ½-inch to the mile.

In commencing the work I started from Jericho, crossing the Jordan at En Nwaimeh, and camping at Kaferin on the plain. Here Olivet was nearly due west, and Gerizim could not be seen, so that for sketching I took bearings to points temporarily fixed in the plain. Rounds of angles with the theodolite with their true bearing, and observations for latitude and time were here made.

The hill-sketching was here commenced, and carried over the country. We went first to Arak-el-Emir, the palace of John Hyrcanus, where similar observations, as at Kaferin, were made; and this system was continued from day to day until we reached Nebbeh, Mount Nebo, where we discovered the ancient town of same name. At this point we were enabled to complete a portion of the triangulation and fix the points securely with reference one to another; we then continued the triangulation and sketching until, on reaching Jebel Husha above Es Salt, we were able to connect the whole work with the hill country of Judea.

In the performance of this work I observed at fourteen separate places for latitude and time, took rounds of angles with theodolite at thirty-three places, at thirteen of which the bearings were referred to the true meridian. I took compass bearings from about 140 points, and 175 sets of altitudes with the aneroid.

A list of 350 Arabic names of places were obtained, and positions fixed; of these, only eighty-four had been known before.

There were also special surveys made of Amman, Jerash, and several of the ruined temples met with; temperature of springs taken; also forty-eight photographs.

The day's programme generally consisted in sketching from 7 A.M. till 5 or 6 P.M.; then a walk up to the hill nearest the camping-ground, for rounds of angles and true bearing; then revision of work, names, &c., obtained during the day, until the time was convenient for astronomical observations for latitude and time; and it was necessary to work these out previous to going to bed.

The names of places were obtained as follows:—When a name was given, I put it down from sound, using Eli Smith's alphabet, as near as I was able, and made one of the servants, who knew English, do the same. I also got the dragoman to write it down in Arabic. As his dialect was totally different to that of the Bedouin, I found it difficult to get him to catch the exact sound, which I could distinguish, but could not be certain of rendering correctly. I found it often necessary that he should repeat the word after the Bedouin several times before he could get it right; he then could write it down correctly or nearly so. In the evening these lists were compared; and on our return to Jerusalem, Dr. Sandreczki, an Arabic scholar, most kindly undertook the revision of the names, making an analysis of them, and being assisted, from time to time, by the Bedouin or native fellahin who happened to come up from these places to Jerusalem. Our difficulty about names, I found, arose from a whole district having a denomination, giving it to everything situated there—thus, in some instances, ruins and hill-tops, a mile apart, had but one name; before this was recognized, it was very puzzling, as the Bedouin appeared to contradict themselves. This may account for the difference of opinion of travellers about certain sites. Another difficulty was, that a valley or watercourse had no constant name for its whole length, but each reach assumed a different designation: thus you might cross and re-cross a wady twenty times in a few miles, and be given a different name for it each time.

It will be well, if possible, for the surveyor to keep lists of the names the wadies take. This he can gradually obtain from the natives; one man may know half-a-dozen consecutive names, and another man be able to carry it on a little further. It will sometimes, however, be found that they cannot remember very perfectly how the names follow, when away from the ground itself. I have often observed this: a man would appear quite idiotic about names, hardly knowing anything beyond the village he lived in, when away from home; but directly he came within a few miles of his district, he would know the name of every hill or river he passed by.

Many of the hills of the country are covered on top with low brush-wood, just high enough to impede the view from the theodolite; and as the Bedouin objected to the manual labour involved in beating it down, a march up a hill sometimes ended in a march down again without any results.

The fine sand, carried in the air from the desert of Arabia, was very detrimental to watches and chronometers, causing them to rapidly get out of order.

In carrying instruments about they should be lightly clamped: if they are not clamped, they will be constantly wearing their parts one against another; if clamped too tight, a fall will seriously strain the weaker portions.

The surveyor, when fully accoutred, is rather heavily weighted. Sketching-case and protractor slung to his back, two aneroids and watch in pocket, two small revolvers and cartridge-box strapped to waist, on his left side a bag containing measuring-tape, &c., pocket-book in pocket. His wallets to contain food and a few spare instruments that may be wanted in case of coming across ruins.

It much depends on the nature of the country whether the survey should be made principally on horseback. In flat country, horses should certainly be used, so as to enable the surveyor to pass rapidly from village to village; in the hills it often happens that the horse cannot be got within a considerable distance of the points from which observations are to be taken.

On the whole, the surveyor can see the country far better when on foot; he can turn round whenever he wishes it and look back, which is often impossible on horseback on rugged paths.

Those who have travelled over the same country on foot and on horseback, will recognize how much better they know the country when acting as pedestrians.

5.—*Ascent of Fuji-Yama in the Snow.* By ARTHUR F. JEFFREYS.

NIPPON,* or Japan, is a most delightful country to travel in for those fond of walking; horse carriages not being used except by the Europeans and a few Japanese living at the Treaty ports, and the native ponies being uncomfortable to ride. Of late years, in the vicinity of all the large towns, a class of vehicles called "Jin-Riki-Shas" has sprung up, which, on a miniature scale, are like our old-fashioned gigs with hoods, having elliptical springs and light wheels; one cooly runs between the shafts, with a second pulling in front by means of a rope, and they go at an astonishing pace.

There are very few roads in Nippon, the principal being the "To-kaido" or Western Road, running from Nagasaki to Tokiyo (Yedo), and the "Oskio-kaido," or Northern Road, from Tokiyo to Hakodati: these are suitable for small carriages, but the paths which traverse the country are very narrow, and are used, for the most part, only by pedestrians and pack-horses.

The Jin-Riki-Sha coolies are good-tempered laughing fellows, and seem to enjoy a run immensely; this class as well as the "Beltoes," or grooms, are usually tattoed in the most wonderful manner, the whole body, excepting always the head and legs below the knees, being covered with huge dragons, fair women, and other devices in black, red, and blue, so that the backs of your tandem (for they always strip as soon as they get outside the town) frequently present quite an attractive picture.

Having arrived at Yokohama towards the end of March, and having a week to spare before setting out on a tour into the interior, I determined to fill up the time by visiting the Mountain of Fuji-Yama, which lies about sixty miles s.w. of Yokohama, and is outside the limits defined by the Treaty, beyond which no foreigners are supposed to go without special passports. The first thing to be done was to find an interpreter, then to secure a cook, and coolies for the baggage; for the European traveller must take a few provisions with him, as joints of meat and wheaten flour, as well as milk and butter, are not used by the natives.

On the 2nd of May, having sent forward the *impedimenta*, I started in the afternoon with a native interpreter. He proved a very poor pedestrian; so, although we had left the Tokaido and were following a narrow path, we still kept our Jin-Riki-Shas, and once the interpreter was capsized into a paddy-field with about six inches of water over it; his crestfallen appearance caused great merriment to me and the coolies.

A large plain extends round Yokohama and Tokiyo, and a range of mountains separates this from the plain in which Fuji-Yama is situated. I did not take the shortest way to Fuji-Yama, as I wished to see the country where the silk is grown. That night I stopped at "Haramatchyda," which is about eighteen miles from Yokohama. The tea-house was full of Japanese, but the best room had been secured for me, and I dined with an old barrel for my table, for there is no furniture in a Japanese house beyond screens and a few articles of lacquer-ware.

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* "Nippon" is the name given by the natives to the whole of the Japan group, *and not to a single island as is usually* done by Europeans.

It has often been told how the "Musumés," or girls of the tea-houses, bring the traveller hot water for his feet on arrival, and attend on him with a most charming grace, so I will forbear repeating the same story again; it is rather embarrassing, however, to be served by these picturesque little creatures on their knees, which is the "mode" here.

The next day we had a delightful walk through a part of the silk district. The mulberry-trees, which are pollarded and therefore small, are planted in the midst of the corn-fields, and were just breaking into leaf; the yellow rape and white turnip flowers formed quite a flower-garden.

At "Tanna," a distance of ten miles, the interpreter gave in and declared he could walk no farther on account of blistered feet; therefore we left him, bidding him follow on horseback or in a "Cango" (*i.e.* palanquin), if he could get either: I never saw him again, so I suppose he returned to Yokohama. With a dictionary in one pocket and a conversation book in the other, I managed to make myself understood fairly well, and fortunately the Book of Nature is the same in all languages. That afternoon we left the plains and ascended the hills towards "Myanashi," which was out of the direction of Fuji-Yama, but worth a visit on account of the scenery.

We left the mulberries with the plains and got into the region of Camellias, Azaleas, and Westeria: these last were of two kinds, blue and white; the Azalias were of many shades, and varying from red and purple to white; the Camellia-trees were chiefly remarkable for their size, reaching a height sometimes of thirty feet. The cottages of the peasants are very picturesque, with their heavy thatched roofs surmounted on the ridge by a row of blue Iris.

The path was rather steep, and the coolies had a march of 26 miles altogether that day. We reached Myanashi, which lies in the midst of hills, about six o'clock: it is a pretty situation, and Europeans frequently stay here during the hot summer months.

On the morrow we retraced our steps, for five miles, to the plain, and then made straight for Fuji-Yama, skirting the base of "Oyama," a mountain of some 6000 feet. There was a strong sun, which, after the previous rain, brought out the insects in great numbers. I noticed most beautiful large swallow-tailed butterflies, of a dark purple, with eyes of a rich orange colour on the wings; there were numerous bright beetles, and on this and the following days I killed several snakes varying in length from two to four feet, most of them being non-poisonous. That afternoon we crossed over a small range by a pass called "Zemba" (as well as I could understand). At the top there was a most charming view over the plain country extending to the sea. Most of the land was under cultivation, and the bright green of the crops gave it a very rich appearance; even the hills, including Oyama, were covered with vegetation, consisting of coarse grass and small shrubs; the country was also very well wooded, the dark Cryptomerias mingling harmoniously with the lighter shades of the annuals. Altogether it would be impossible to picture a more beautiful agricultural country.

That night we stayed at a village called "Matsuda," having walked about 27 miles during the day.

Matsuda is outside the Treaty limits, and the "Yakonin," or official, might have turned me back, but he contented himself with taking my name. We put up at the Temple; a great many of these places, as in China, have strangers' quarters attached to them. Whenever I stopped to rest, on this and other expeditions, the people were very civil, but very inquisitive. The first question usually is, "Anāta dōko māro-māro?" ("Sir, where are you going?") in a most insinuating tone: on being answered, they say, "So!" (something after the German manner), which has a world of meaning according to the inflection of the voice. They then ask, "And where do you come *from?*" and if they are "Musumés," and become chatty, they proceed to ask the traveller's age, and have great fun in guessing it. In all conversation they are extremely polite and well mannered.

We left Matsuda early on the morning of the 5th of May, and crossed the principal range of mountains which separates the country about Yokohama and Tokiyo from that surrounding Fuji-Yama and Kiyoto.

There are several passes over this range; those of "Hakoni" and "Tomé-Toogi" being the best known. We crossed by one called "Yangarusāwa." Here we saw the lacquer-tree, the juice of which forms the beautiful varnish.

Up to this time Fuji-Yama had been hidden from us by the mountains; but at the top of the pass the path took an abrupt turn, and we were brought face to face with the giant standing alone on the plain, its snowy side glittering in the sunshine; it appeared very close to us, but in reality it was about twelve miles distant. Fuji-Yama means "The unequalled Mountain:" it does not form part of a range, but rises from the plain in the shape of a perfect cone, with the apex broken off where the old crater is. As we then saw it, covered with snow, I certainly think it unequalled for beauty by any mountain in the world.

Having descended the pass, we had a walk of about eight miles to the village of "Sybashiri," which we reached at 3 P.M.

For some distance round the mountain the soil is formed of decomposed scoria; vegetation being represented by fir-trees and hardy shrubs. I noticed men working hand-ploughs to-day; these are made of wood in the common shape, but are used like spades; that is to say, the plougher digs it into the ground, and one or more men pull it a few inches through the soil by means of a kind of handle which projects in front.

We found mine host of the tea-house, where we stopped, very drunk; but we managed to secure the services of three guides, an axe, a piece of rope, and torches, for the ascent the next day.

"Sybashiri," or "Subashiri," is one of the three villages from which the pilgrims commence the ascent of Fuji-Yama. It lies on the east side of the mountain, and is about 800 feet above the level of the sea. "Yoshida" is the similar village on the north side, and "Murayāma" that on the south. Sybashiri consists of one long street, with a stream running down it. At the top of this street is a temple, dedicated to the tutelar deity of Fuji-Yama; for the natives consider the mountain as very sacred, and endeavour to ascend it once in their lives, coming from all parts for this holy purpose during the summer months when the snow has disappeared.

The guides slept in the tea-house, so there was no difficulty about making an early start at 3 A.M. the following morning. The guides and my two servants laughed at the idea of reaching the top in the snow; but having promised them good "Cumshaws" if we succeeded, we set out in good spirits.

There was no need of the torches, as a bright moon showed us the way. Having passed through the grounds of the temple, we entered a long avenue of fir-trees leading up a gentle ascent towards the mountain. After about 3½ miles, we came to a collection of sheds, where the pilgrims usually leave their ponies, but which at that time of year were unoccupied.

We then followed a narrow, but very fair path, for a mile and a half, the incline being steeper. There were a number of uninhabited rest-houses at intervals, in some of which the pilgrims are wont to sleep before making the ascent. The guides were very slow walkers, and we had some difficulty in making them keep up with us.

A mile more and we reached the snow. Soon after which, after having emerged from the jungle of stunted fir-trees and larches, we found ourselves at the foot of the enormous cone.

At the first start I felt as if we were bent on some murderous expedition, *stealing away thus in the dark*; but now that the sun rose in full glory, it seemed to encourage us to do an honest day's work. The ascent became gradually steeper, but the snow gave us a very good foot-hold. A fresh series of rest-houses now commenced, numbered 1 to 10, the last being on the summit; and the Japanese always fix the height to which they have ascended, by naming the number of the rest-house. At this time they were all buried in snow, with the exception of their roofs, whereon we sat and rested.

We had a most glorious day, without a breath of wind, and the mountain shone with such dazzling brightness that our eyes were hurt by looking on it.

In the early morning a few clouds clung about the foot, and two small lakes in particular, covered with mist, looked like sheets of white wool stretched on the plain. I was reminded of the lines:—

"Like some tall cliff that lifts its awful form,
Swells from the vale and midway leaves the storm,
Though round its base the gathering clouds may spread,
Eternal sunshine settles on its head!"

We kept on a ridge nearly all the way up, so had no very great depth of snow till we neared the summit. On the northern side of this ridge, a large scoop seemed to have been taken out of the mountain; but, in consequence of the eruptions in former days, the sides are most wonderfully regular, there being no great ravines nor glaciers.

As we toiled up, a very sleepy feeling came over us, and the coolies would give way to the temptation occasionally as we rested. One of the men was knocked up, so we left him sitting on the roof of a rest-house. The ninth and tenth stages were very severe; the incline was extremely steep, and the snow was perfectly frozen and covered with a coating of ice, so that one of the men was obliged to cut steps one by one with the axe, whilst I followed and the rest behind; and in this manner, taking about half a minute for each step, we painfully climbed up the difficult ascent to the summit, which we reached at noon precisely.

There is only a narrow and very irregular rim round the old crater, which is half a mile or so in circumference, although the Japanese tell you that it is two "Ri," or nearly five miles.

The crater was then about 150 feet deep, having a quantity of snow in it, which gave it the appearance of a hollow inverted cone. The men with me were rather awe-struck, and would not let me throw a stone into the crater. I noticed that each of them said a prayer immediately on reaching the top, and seemed in a great hurry to get down again. As there was a great quantity of ice about, and the rim was formed of rugged and uneven rocks, we tied ourselves together as a precautionary measure.

Although there were no clouds near the mountain, yet, in consequence of the powerful sun, mists were rising over the plains, and the view was not so extensive as I had anticipated.

We saw the Hakoni Lake and Pass to the S.E. by S., Odawara Bay on the N. by E., Tokio or Yedo to the N., Mount Asamayāma, and a high snow-capped range to the N.W. by N. The men were in a great hurry to descend, and, as it was bitterly cold, I was not sorry to beat a retreat.

I went first, and the rest held on to the rope, whilst I cautiously proceeded from step to step. I don't think that the rope would have stood a severe strain, so was glad to get down without having put it to the test.

We set a piece of rock gently in motion from the top, and the velocity it acquired as it rolled over the smooth snow was enormous. About half-way down it came in contact with some scoria that projected above the surface, and it then took a leap of about a quarter of a mile.

We were obliged to descend by the same way that we had ascended, for it *would have been* impossible to have cut steps as we were descending.

After reaching the seventh stage, one of the men and I left the rest, and arrived at Sybashiri some time before them, pounding through the soft snow at a great pace. The height of the mountain, by the latest calculation, is 13,080 feet, though it is generally reckoned as 14,000 feet. Its height appears more than it is in reality from a comparison with other mountains of the same size, from the fact of its rising from such low ground; whereas other mountains are usually seen standing on high ranges. I should call the actual walking distance from Sybashiri to the top, about 8½ or 9 miles, and we made the ascent in 9, and the descent in 4½ hours.

I heard that only one European before me had ever ascended to the top of the mountain at this time of year, but that I stood alone in having accomplished the ascent and descent in one day.

The following morning we crossed the range between Fuji-Yama and the sea by a pass called Tomé-Tongi, some way to the south of where I had crossed before, and reached the village of "Myanoshta," which is the summer retreat of the Mikado, and a favourite place of resort for the Europeans from Yokohama in the hot summer months. It is about 17½ miles from Sybashiri. It rained during the afternoon, and we were glad to put up at the excellent tea-house—the best in Japan, I believe.

The scenery is exceedingly beautiful, the village being situated on the southern slope of a long valley, with mountains on both sides. It is celebrated for its hot springs, which the Japanese, and even foreigners, enjoy immensely for bathing purposes. A river winds along the valley to the sea at O-dawara, a distance of seven miles, and forms some pretty waterfalls in its course.

The next day was very gloomy, the valley being filled with mist, and the rain coming down like a water-spout; but as I had arranged to be back at Yokohama that evening, we set out with Japanese umbrellas and waterproof coats made of oil-paper, which kept us fairly dry to O-dawara, where we took Jin-Riki-Shas to Yokohama, a distance of 35 miles.

I may remark that a thin tough kind of paper, made from the bark of a tree, is used in Nippon for many things, including pocket-handkerchiefs and waterprooof coats.

We reached Yokohama that evening, after an excellent trip of 6½ days; and from my experience of this and several other expeditions, I can recommend anyone who is fond of walking through a charming country, peopled by an exceedingly kind and amiable race, to pay a visit to the Land of the Rising Sun.

6. *Exploration of the Arctic Regions.* A Letter from Dr. PETERMANN to the President of the Royal Geographical Society.*

"SIR,

"Ten years ago, when Arctic Exploration was sought to be revived by the Royal Geographical Society, all, I think, were agreed as to the main points of the subjects, while a diversity of opinion arose regarding one point, which appears to me only of secondary importance now, namely, the route to be chosen. There was a great deal of discussion upon this point, and whether it would be more advisable for a new English Expedition to proceed west of Greenland up Smith Sound, or east of it, anywhere in the wide sea between Greenland and Novaya Zemlya.

"From the results arrived at by actual exploration since 1865, and the light shed by it upon the subject, it appears to me, that a real ground for any such diversity of opinion no more exists, as the most noteworthy fact brought out by the various recent Polar Expeditions is a greater navigability in all parts of the Arctic Seas than was formerly supposed to exist.

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* *Read, in part, at the Meeting of* the 10th November, 1874; vide ante, p. 35.

"For my part, I readily admit that the Smith Sound route has turned out to be a great deal more practicable and navigable than could formerly be surmised from the experience of Kane and Hayes. Certainly both these attempts were made with insufficient means; Kane's *Advance* being only a sailing-brig, heavily laden and blown about by unusually strong gales, and Hayes' schooner, the *United States*, a mere sailing-vessel of 133 tons, not fit for navigation in the Arctic Seas. When therefore Hall, in 1871, tried this route with the *Polaris*, he achieved most astounding results, for he sailed and steamed from Tessiusak without interruption in one stretch through the ill-famed Melville Bay, Smith Sound, Kennedy Channel, and into new seas as far as 82° N. lat., a distance of 700 miles, with the greatest ease, in seven days, and even reached beyond the 82nd parallel. Yet his vessel, the *Polaris*, was only a small, weak-powered steamer, by no means well fitted for the work, and manned by a motley crew hampered by Eskimo families and little children.

"While I thus readily admit my expectations to have been far exceeded by recent experience, similar progress has also been made on all the other routes into the central area of the Arctic Regions, and a great deal has been achieved, even with small means. From the results already arrived at, it is evident that, with appropriate steam-vessels making use of the experience gained, the central area will be penetrated as far as the North Pole or any other point.

"As I cannot but think that an English exploring expedition will soon leave for the Arctic Regions, I take this opportunity to state to you, explicitly, that I withdraw everything I formerly said that might be construed into a diversity of opinion on the main points at issue, and that I now distinctly approve beforehand of any route or direction that may be decided on for a new expedition by British geographers.

"For those expeditions which I myself have been able to set on foot since 1865, the most direct and shortest routes and the nearest goals seemed the most advisable, as only very small means would be raised, and these chiefly by promising to break new ground and opening new lines of research never before attempted. With the same small means at our command, we could not have done as much as we did elsewhere. At my instance, more or less, seven very modest expeditions and summer cruises went forth; the first one—a reconnoitring tour, in 1868, under Captain Koldewey—consisted of a little Norwegian sloop of only about 60 tons, no bigger than an ordinary trawling-smack; she was purchased at Bergen, received the name *Germania*, and went towards East Greenland, then to the east of Bear Island, on the north of Spitzbergen, beyond the 81st parallel, and surveyed portions of East Spitzbergen not before reached by English or Swedish Expeditions. Next year, 1869, started the so-called second German Expedition, consisting of two vessels, a screw steamer of 143 tons, called the *Germania*, and a sailing-brig of 242 tons, called the *Hansa*, as a tender; they went again to East Greenland, explored this coast as far as 77° N. lat., and discovered a magnificent inlet—Franz Joseph Fjord—extending far into the interior of Greenland, navigable, and the shores of it enlivened by herds of reindeer and musk-oxen. It was also shown that the interior of Greenland in this region consists not of a slightly elevated tableland, as formerly supposed, but of splendid mountain masses of alpine character. The account of this expedition, which also wintered on the coast of East Greenland in 74½° N. lat., is before you in an English dress. Besides this, I got my friend Mr. Rosenthal, a shipowner, to allow two scientific men, Dr. Dorst and Dr. Bessels, to accompany two of his whaling steamers, one to explore the seas east of Spitzbergen, the other those east of Greenland; both made highly interesting and valuable scientific *observations*, which have not yet been published. In 1870, my friends Baron

Heuglin and Count Zeil went from Tromsö in a small schooner of 30 tons to East Spitzbergen, and collected most interesting information on a region never before visited by scientific men; and when Baron Heuglin had been out a second time the next following year (1871), again with one of Rosenthal's Expeditions, he published a valuable work in three volumes. In the same year Payer and Weyprecht went in the *Isbjörn*, a sailing-vessel of 40 tons, from Tromsö, to explore still further northward than Bessels the sea east of Spitzbergen, which was done with great success as high up as 78° 43′ N. lat. (in 42¾° E. long. Gr.) and as far east as 59° E. long. The scientific results of this cruise have also not yet been fully worked out.

"Thus from the interior of Greenland in 30° W. long. to 59° E. long. east of Spitzbergen, a width of about 90 degrees of longitude have been explored and highly-interesting results obtained. The cost of these seven expeditions and cruises was about 140,000 thalers, or altogether, 20,000*l.*, of which only 5000 thalers or 750*l.* were contributed by the Government of Germany, all the rest by private individuals, my friend Rosenthal spending upwards of 30,000 thalers. Half of the results of these expeditions have not yet been published, but the work of the second German Expedition in four volumes, and that by Baron Heuglin in three volumes, are finished, and are, I think, a credit to the explorers.

"I have mentioned these details in order to show that such endeavours to extend human knowledge improve the spirit of the navy, foster a taste and progress of science, and are not necessarily expensive. A really effective expedition will cost more, but also accomplish more; in this respect, a writer in the 'Athenæum,' in reviewing our second expedition, says that 'to start on expeditions such as these in vessels ill-adapted, ill-strengthened, ill-found, and ill-provisioned, is but to court failure,' to which I say Amen.

"One well-appointed English expedition of one or two strong steamers may well be able to penetrate to the furthest points of our globe. Even the whaling ships, now furnished as they are with steam, penetrate, as a rule, to where it was formerly thought impossible for such a fleet to pursue their valuable fisheries; the ill-famed middle ice of Baffin Bay is to them no longer impenetrable, and extreme points reached by former discovery expeditions, in the course of a long series of years, are now visited and passed by one whaling vessel in the course of a few summer months.

"Up to 1869 the general opinion was that from Bear Island in 74½° N. lat. there extended the line of heavy impenetrable pack-ice eastward as far as Novaya Zemlya, that, working along this coast, the furthest limit of navigation was at Cape Nassau, and that the Kara Sea was entirely and always filled with masses of ice, totally impracticable for any navigation. But the Norwegians, with their frail fishing-smacks of only 30 tons at an average, have, for five consecutive years, every year navigated all those seas hitherto considered as totally impenetrable; they have repeatedly circumnavigated the whole of Novaya Zemlya, crossed the Kara Sea in every direction, penetrated to the Obi and Yenisei, and shown, beyond the shadow of a doubt, that navigation can generally be pursued there during five months of the year, from June to October, and moreover that the whole of the Kara Sea and the Siberian Sea far to the north are every year more or less cleared of their ice, both by its melting and drifting away to the north. I have had the journals of many of these cruises sent to me from Norway, containing a mass of good observations made at the instance of the Government Meteorological Office under the superintendence of Professor Mohn at Christiania. If another proof of confirmation were wanting, it has been furnished by Mr. Wiggins of Sunderland, who this summer also navigated through the Kara Sea as far as the mouth of Obi.

"*As to the sea between* Novaya Zemlya and Spitzbergen, the very first time in our days its navigation was attempted, namely, by Weyprecht and Payer in 1871, it was found navigable, even to a small sailing-vessel of 40 tons, up to 79° N. lat., and in the eastern half of it no ice whatever was met with. The experience of their last expedition in 1872 certainly has been the reverse, as they encountered much and dense ice at least in the direction of Cape Nassau, but it would lead to erroneous conclusions, if it were not taken into account that the Norwegians at the same time found the western half of that sea quite free of ice.

"I am not going to make any remark upon the late Austrian Expedition, as its results and observations are not yet sufficiently before us, but I am authorised by a letter of Lieutenant Weyprecht, the nautical commander, dated the 1st November, to state that, before he has published his extensive observations, he warns against all premature conclusions, and concludes the letter—which I shall publish in the next part of the 'Mittheilungen,' and in which he expresses his own views on the Arctic question for the first time—with the sentence: 'That he considers the route through the Siberian Sea as far as Behring Strait as practicable as before, and would readily take the command of another expedition in the same direction.'

"I believe myself that the navigability of the seas to the north of Novaya Zemlya can as little be called in question by this one drift of the Austrian Expedition as the navigability of Baffin Bay by the drifts of De Haven, M'Clintock, and the crew of the *Polaris*. These drifts by no means prevent others penetrating the same seas.

"And here I may be allowed to refer in a few words to the other end of this route, the seas north of Behring Strait. Captain Cook in 1778, and his second in command, Captain Clerke, in 1779, believed to have reached the extreme limit of navigation by attaining Icy Cape (in 70½° N. lat.) on the American, and North Cape (in 69° N. (lat.) on the Asiatic side, and they considered further attempts there as madness as well as to any practical purpose useless. Captain Beechey, however, with his lieutenant, the present Admiral Sir Edward Belcher, penetrated already in 1826 as far as Point Barrow, and expressed the result of his experience in the weighty sentence, 'I have always been of opinion that a navigation may be performed along any coast of the Polar Sea that is continuous.'* And, true enough, many a follower has sailed along the whole of the northernmost coast of America, though exposed to the pressure of the immense pack-ice masses from the north impinging upon these coasts. Captain Kellett, with the *Herald*, a vessel not intended for ice navigation, penetrated in 1849 with ease to 72° 51′ N. lat. into the Polar Sea, so much dreaded by Cook and Clerke; discovered Herald Island and—what is now called by some—Wrangel Land, and found the ice not at all so formidable as supposed previously. Going over the similar experience of Collinson, M'Clure, Rodgers, and others, we come to the time when the Americans established a highly profitable whale fishery in seas considered entirely useless by Cook and Clerke, gaining as much as eight millions of dollars in two years. It was in one of these years that a shipmaster went as far as 74° N. lat. nearly due north of Herald Island, and saw peaks and mountain ranges far to the northwest of his position.† Another, Captain Long, went a considerable distance along the Siberian coast to the west, and did more in a few days with a sailing-vessel than Admiral Wrangel had been able to accomplish with sledges in winter, in the course of four years, in the same region. In a letter dated Honolulu, 15th January, 1868, he says:—'That the passage from the Pacific to the Atlantic Ocean will be accomplished by one of the routes I have indicated, I have as much faith in, as I have in any uncertain event of the future, and much more than I had fifteen years ago in the success of the Altantic Telegraph. Although this route will be of no great importance to commerce, as a transit from one ocean to the other, yet, could the passage along the coast as far as the mouth of the Lena be successfully made every year (which I think probable), it would be of good benefit in developing the resources of Northern Siberia.'[*]

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* Beechey, 'Voyage,' vol. ii., p. 297.

† 'Proceedings of the Royal Geographical Society,' xii., p. 99.

"To the north-east of Spitzbergen, also, an interesting cruise was recently made by Mr. Leigh Smith, who in 1871, with only a sailing schooner of 85 tons, reached as far as 27° 25′ E. of Gr. in 80° 27′ N. lat., 4 degrees of longitude further than any authenticated and observing navigator before him. At this point he had before him, to the east, consequently in the direction of the newly-discovered Franz Joseph Land, nothing but open water on the 6th of September, 1871, as far as the eye could reach.

"That land would be found in the locality where the Austrian Expedition actually found it, I have long predicted. Gillis Land, after Keulen's map, generally considered to be situated in 80° N. lat. 30° E. long.—by the Swedish explorers erroneously put down in 79° N. lat.—I have, from the original text, concluded to be in 81½° N. lat. and 37° E. long. Gr. This approaches to within 80 nautical miles of Franz Joseph Land, which was sighted westward as far as 46° E. long, but in this longitude there was not as yet any limit of the land. The flight of immense numbers of brent geese and other birds in the same direction has long been observed by various voyagers, and it has also been noticed that not only migrations of birds, but also of mammals, take the same direction; the Norwegian fishermen on the north of Spitzbergen have repeatedly caught immense numbers of walrus and ice-bears at the Seven Islands, and especially on their north-eastern side, whereas at Spitzbergen the walrus is now very scarce and the ice-bear almost extinct.

"I consider it also highly probable that that great Arctic pioneer and navigator, William Baffin, may have seen the western shores of Franz Joseph Land as long ago as 1614; for in that year he proceeded to 81° N. lat., and thought he saw land as far as 82° to the north-east of Spitzbergen, which is accordingly marked in one of Purchas's maps.[†] It is true the account of this voyage is very meagre, but so is the account of his voyage and still greater discovery of Baffin's Bay two years after, which Sir John Barrow calls 'the most vague, indefinite, and unsatisfactory,' and on his map leaves out Baffin's Bay altogether; and this, be it observed, in the year 1818.[‡] Barrington and Beaufoy, though inserting Baffin's discoveries in their map, dated 1st March, 1818, describe them in the following words:—'Baffin's Bay, according to the relation of W. Baffin in 1616, *but not now believed*'! With Barents' important voyages and discoveries it is exactly the same. The Russians, who only navigated as far as Cape Nassau, also tried to erase Barents' discoveries from the map, and cut off the north-eastern part of Novaya Zemlya altogether.[§] But old Barents has been found more trustworthy and correct than all the Russian maps and pilots put together. Even the identical winter-hut of that great Dutch navigator, nearly 300 years old, has been found by the Norwegian Captain Carlsen on the 9th September, 1871, and many interesting relics brought home by him, so that the truth and correctness of those famous old Dutch voyages has been proved beyond all doubt. In like manner, Baffin's voyage to within sight of the western shores of Franz Joseph Land may be considered trustworthy until some substantial proof of the contrary is brought forward. Nay, it even appears to me that the report given of another remarkable voyage of a Dutch navigator, Cornelis Roule, merits attention, and is to be considered in the same way as Baffin's and Barents', so that if it be as true as the voyages of these navigators, it may yet be found that Franz Joseph Land was already discovered, and sailed through up to 74½° or 75° N. lat., nearly 300 years ago. This report runs thus:—'I am informed with certainty that Captain Cornelis Roule has been in 84½° or 85° N. lat. in the longitude of Novaya Zemlya, and has sailed about 40 miles between broken land, seeing large open water behind it. He went on shore with his boat, and from a hill it appeared to him that he could go three days more to the north. He found lots of birds there, and very tame.'* Now, the mean longitude of Novaya Zemlya is 60° E. Gr., and passes right through Austria Sound and Franz Joseph Land: the latter is a 'broken land' also, behind which Lieutenant Payer saw 'large open water' and found 'lots of birds'!

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[*] 'Nautical Magazine,' 1868, p. 242.

[†] 'Barrington and Beaufoy,' pp. 40 and 41.

[‡] 'Barrow's Chronological History,' p. 216 and map.

[§] This was actually attempted by a pilot of the Russian Imperial Marine, and found its way also into vol. viii. of the 'Journal of the Royal Geographical Society,' p. 411, where the map is spoken of as "showing the *actual* outline of its coasts, as traced by the pilot Ziwolka, from the latest examinations, by which it will be seen that more than the eastern half represented on our maps has no *existence in reality*."

"Be this as it may, we now come to Sir Edward Parry's voyage north of Spitzbergen, regarding which it is an undoubted fact that he reached 82° 45′ N. lat., the furthest well-authenticated point yet reached by any navigator, and a feat unsurpassed to this day.

"There is, however, no doubt that the northern coast of Spitzbergen lies just in the teeth of one of the most formidable ice-currents, and one that, summer and winter, is sweeping its ice-masses just towards these coasts. If, therefore, an English expedition should take Spitzbergen as a basis to start from, it would require two vessels, one of which ought to go up the west coast, the other up the east coast: for, when northerly and westerly winds prevail, the first vessel would probably be hampered by ice, and the second vessel find it navigable up the east coast; and, if easterly and southerly winds prevailed, the reverse would be the case.

"It is by way of Smith Sound, however, that navigation has hitherto been pushed furthest; and here an English expedition, so long projected, may well operate. At the same time, the east coast of Greenland seems still worthy of attention. The second German Expedition did not proceed far to the north, it is true, but it was easy enough to reach the coast; and Lieutenant Payer told me this was merely something like a 'cab's drive.' Captain Gray of Peterhead, a most experienced Arctic navigator, wrote already in 1868 thus:—'Having for many years pursued the whale fishery on the east coast of Greenland, and observed the tides, the set of currents, and the state of the ice in that locality at various seasons of the year, I think that little, if any, difficulty would be experienced in carrying a vessel in a single season to a very high latitude, if not to the Pole itself, by taking the ice at about the latitude of 75°, where generally exists a deep bight, sometimes running in a north-west direction upwards of 100 miles towards Shannon Island, from thence following the continent of Greenland as long as it was found to trend in the desired direction, and afterwards pushing northwards through the loose fields of ice, which I shall show may be expected to be found in that locality. The following are the reasons on which that opinion is founded:—In prosecuting the whale fishery in the vicinity of Shannon Island, there are generally found loose fields of ice, with a considerable amount of open water, and a dark water-sky along the land to the northward; the land-water sometimes extending for at least 50 miles to the eastward; and, in seasons when south-west winds prevail, the ice opens up very fast from the land in that latitude.

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[*] Wilsen, 'N. & O. Tartarye,' folio, 1707, 2. deel, p. 920. See also '*Proceedings of the Royal* Geographical Society,' vol. ix. p. 178.

The ice on the east coast of Greenland is what is termed field or floe ice, the extent of which varies with the nature of the season; but it is always in motion, even in winter, as is proved by the fact that ships beset as far north as 78° have driven down during the autumn and winter as far south as Cape Farewell. Thus there is always the means of pushing to the northward, by keeping to the land-ice and watching favourable openings,"* &c.

"And quite recently, in communicating the result of his experience the present year, he writes:—'During the past season I had too many opportunities of observing the drift of the ice. In May, June, July, and August, its average drift was fully 14 miles a day; in March and April it must have been driving double that rate. I calculate that nearly the whole of the ice was driven out of the Arctic Basin last summer. I went north to 79° 45′ in August, and found the ice all broken up; whereas down in 77° the floes were lying whole in the sea, clearly showing that the ice in 80° must have been broken up by a swell from the north; beyond the pack to the north, which I could see over, there was a dark water-sky reaching north until lost in the distance, without a particle of ice to be seen in it. I was convinced at the time, and so was my brother, that we could have gone up to the Pole, or at any rate far beyond where anyone had ever been before. I bitterly repent that I did not sacrifice my chance of finding whale, and make the attempt, although my coals and provisions were wearing down. Although I have never advocated an attempt being made to reach the Pole by Spitzbergen, knowing well the difficulties that would have to be surmounted, my ideas are now changed, from what I saw last voyage. I am now convinced that a great advance towards the Pole could occasionally be made without much trouble or risk by Spitzbergen, and some of our amateur navigators will be sure to do it, and pluck the honour from the Royal Navy. I do not know if the *Eclipse* will be sent to the Greenland whale fishery next year; if I go, I shall be able to satisfy myself more thoroughly as to the clearing out of the ice this year, because it will necessarily be of a much lighter character than usual.'†

"If this important information should be considered worthy the attention of the British geographers and the Admiralty, there would, perhaps, be two steamers sent out to make success doubly certain: one to proceed up the west coast of Greenland, by way of Smith Sound, the other up the east coast of Greenland.

"But whatever may be decided on, I trust that the British Government will no longer hold back to grant what all geographers and all scientific corporations of England have been begging for these ten long years, and afford the means for a new effective expedition to crown these our modest endeavours, of which I have given an outline. We in Germany and Austria have done our duty, and I am happy to have lived to see that our humble endeavours, the work of our Arctic explorers, have gained your approbation, that of the Royal Geographical Society of Great Britain. We have done all we could in the private manner we had to do it; for, as a nation, we Germans are only now beginning to turn our attention to nautical matters. We have had no vessels, no means, and our Government has had to fight three great wars these ten years. But nevertheless we have had in this interval German, Austrian, American, Swedish, Norwegian, Russian Polar Expeditions, in which even an Italian officer took part, at the instance of the Italian Government. And England, formerly always taking the lead in these matters, is almost the only maritime power that has kept aloof. When, nearly thirty years ago, one man of science proposed that magnetical observations should be extended, it was at once answered by the Government then by sending out to the Antarctic Regions an expedition of two vessels, the *Erebus* and *Terror*, under that great navigator Sir James Clarke Ross, which has never yet been eclipsed as to the importance of its results and the lustre it shed on the British Navy. I do not know the views held in England now, but I know that to us outsiders the achievements and work of a man like Sir James Clarke Ross or Livingstone have done more for the prestige of Great Britain than a march to Cumassi, that cost millions of pounds sterling. That great explorer, Livingstone, is no more; his work is going to be continued and finished by German and American explorers. We shall also certainly not let the Arctic work rest till it is fully accomplished; but it surely behoves Great Britain now to step in and once more to take the lead.

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* 'Proceedings of the Royal Geographical Society,' vol. xii. p. 197.

† Letter of Captain David Gray to Mr. Leigh Smith, dated "Peterhead, 21st *September, 1874.*"

"I have the honour to be, Sir,
"Your very obedient humble servant,
"AUGUSTUS PETERMANN,
"Honorary Corresponding Member and Gold Medallist
"of the Royal Geographical Society.

"*Gotha, 7th November*, 1874."

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[Published March 24th, 1875.]

SESSION 1874–75.

Fifth Meeting, 25th January, 1875.

Major-General Sir HENRY C. RAWLINSON, K.C.B., President, in the Chair.

Elections.—*Edwin Arnold, Esq.; Howard Barrett, Esq.,* M.R.C.S., *&c.; John Burgoyne, Esq.; Count de la Chapelle; Samuel Figgis, Esq.; Rev. C. R. de Havilland; Campbell Mackintosh Keir, Esq.; Lieut. Herbert H. Kitchener,* R.E.; *Dr. Samuel Mason; B. Leigh Smith, Esq.,* M.A.; *Hon. E. Lyulph Stanley; Cuthbert E. Peek, Esq.; Arthur Pennell, Esq.; John George Thompson, Esq.; Robert Carr Woods, Esq.*

Presentation.—*W. Powell Branson, Esq.*

Donations to the Library from January 11th to January 25th, 1875.—G. Rohlfs'sche Expedition nach der Libyschen Wüste, 1873–74, in Photographien von Ph. Remelé, Mitglied der Expedition (*Dr. Rohlfs*). Selections from the Records of the Bombay Government, No. CXLIV., new series (*the India Office*). Carte Agricole de la France; by M. Delesse, 1874 (*Author*). Realidad del Equilibrio Hispano-Americano, &c.; Pt. I., Ataçama y El Chaco; by Julio Mendez, 1874 (*Author*). Bolivia and Brazil in the Amazon Valley; by E. G. Church, 1870 (*Author*). Geological Notes on the Noursoak Peninsula, Disco Island, and the country in the vicinity of Disco Bay, North Greenland; by R. Brown, 1875 (*Author*). Monthly Reports of the Department of Agriculture for 1873 (*Librarian*); and the current issues of corresponding Societies, &c.

Donations to the Map-room since the last Meeting of January 11th, 1875.—*Topographical* map of the province of Entre Rios.

Compiled and constructed by Meliton Gonzalez. 1874. Five sheets (*Charles Burton, Esq.*).—A Pictorial diagram, showing the Principles of Magnetism (*J. Reynolds, Esq.*, F.R.G.S.). A Pictorial diagram, showing the Principles of Electricity (*J. Reynolds, Esq.*, F.R.G.S.). 93 Sheets of French Charts and 3 books of Pilotage. (*Presented by the Dépôt de la Marine.*)

COLONEL GORDON'S EXPEDITION.

The PRESIDENT said that many present would remember he informed the Society, on the opening night of the Session, that two young Engineer officers, Messrs. Watson and Chippendale, had left England, during the previous summer, to join Colonel Gordon in the Lake Regions of the Upper Nile. The duties of these officers were to be exclusively exploration and survey, and the Council and himself had readily acceded to the request to furnish them with instruments and such information as was required. He had now the pleasure to inform the Meeting that these young officers had arrived safely at Gondokoro, and that no time had been lost by their chief in setting them to work. According to letters received since the last meeting, they reached Gondokoro on the 14th of November, and were ordered before the end of that month to proceed to explore Lake Albert Nyanza, a small vessel for the purpose having been previously conveyed to Duflè, a station above the falls which obstruct navigation between Gondokoro and the Lake. Colonel Gordon, in a letter to himself, dated the 18th of November, reported that Messrs. Watson and Chippendale were then testing their instruments preparatory to their important journey, in conjunction with M. Linant, another member of the Expedition, who was under orders to proceed to the "Somerset Nile" of Speke, and Victoria Nyanza. As he had informed the Society on a previous occasion, he had applied for and obtained the sanction of His Highness the Khedive to the communication of the geographical results of this great enterprise, and it was gratifying to learn how heartily His Highness had entered into the views of the Council, for Colonel Gordon stated, in the same letter, that he had been ordered by the Khedive to send him duplicate copies of all his geographical work, one copy being for the Royal Geographical Society. Although it was wise not to be too sanguine in our expectations of events in a region so full of difficulty and uncertainty as Central Africa, he thought we might safely look forward to early and important intelligence from Colonel Gordon and his staff.

In introducing Dr. MULLENS, the author of the paper on Madagascar, now about to be read, the President said that he was a gentleman of varied and extensive knowledge and an acute observer. Although he had spent only a year in the island, he had obtained as much information as most people would have acquired during a residence of twenty years. The maps which he had brought home were beautiful specimens of cartography, and a great number of photographs had also been prepared, giving a very good idea of what the interior of Madagascar is.

On the Central Provinces of Madagascar. By JOSEPH MULLENS, D.D., Foreign Secretary of the London Missionary Society.

[ABRIDGMENT.]

THE chief physical feature of Madagascar is the central mountain mass, which commences with lofty hills at its northern extremity, and retains them till within a moderate distance of its southern cape. This mighty mass is by no means uniform in its appearance. Ascending from the eastern coast to the capital, the traveller meets and successively passes three lofty mountain-walls, each supporting a broad terrace behind it. The first and lowest meets him at two days' distance from the coast: the second lies behind, two days further off, near the forest-station of Beforona: over the third (the object of his deserved admiration, as it stretches away far, far to the north, still on and on to the south), he climbs by the lofty pass of Angavo, and then finds himself on the broad plateau of Imerina, the dwelling-place of the ruling tribes. On the western side also the terraces exist, and are descended one by one, though they are not so grandly marked as on the east coast, and are more easy to travel. On our own journey from Imerina to the north-west, along the line of country followed by the two principal rivers, we experienced four special descents, each being over 800 feet, and each having a distinct pass. The line across these passes is the line of the ancient tribal raids, and along which the present military posts are established.

On the east side of the island the three walls converge on a common point toward the northern districts. In visiting the Sihánaka province we saw the two higher lines meeting beyond the Alaotra Lake, in lat. 16° 40′; and the wild sea of hills resulting shows the grandeur of the forces employed in shaping their present form. Away to the south the terraces keep distinct, until (as we saw for ourselves) they are crossed, in lat. 22°, by a strong range which runs from west to east, when they come to an end, and fall into that level plain swept by the south-east winds, on which M. Grandidier found new shells and bones of Sinbad's celebrated birds. The terraces seem to be between 30 and 40 miles wide. They are far from level. Strong winds, heavy storms of rain, waterspouts, torrents, have cut deep channels in the sandy red clay, which has been deposited among the gneiss rocks, which form the basis of the island; and as these hills and cuttings follow largely the northerly set of the granite ranges, while the water seeks an outlet in the sea, we found ourselves in a maze of red hills, and went forward up and down, down and up, many times in a day, multiplying indefinitely the miles we travelled, and along which our wearied men lifted us and carried us to the city which was to be our home. On the west side of Imerina the red hills are even more conspicuous. We saw them at many points: it was impossible to map them, the gullies are so numerous; but we had to travel among them again and again, and found nothing in our journeys so painful to traverse. Such a hilly country, so continuously hilly as Central Madagascar I have never seen in all my wanderings in the United States or in the Eastern world.

The principal portion of the central plateau is occupied by the plain of Imerina, and its southern continuation, the Betsileo province. At its north end this plain is bounded by the mountain mass of Andringitra, and the hills of Manga and Molangána. On the east it begins above the Angavo forest, and goes westward to Ambohiveloma and Itasy, where it falls into the western plains. In this part the province has a breadth of 90 miles, and a nominal length of 110 miles. Eastern Imerina is pierced by granite hills, and ranges more or less high, which bear upon their shoulders barren moors, swept by the hard east winds. The South has been greatly affected by the volcanic disturbances which I shall shortly describe. It has few fertile spots, and its population is scattered and thin. The thoroughly-cultivated parts of Imerina are spread over a space of 50 miles by 25: about 1250 square miles in all. Even here the level is not perfect. Low ridges of red clay run across the plain, generally from the west and north-west, toward the south-east; and it is on these, and on isolated portions of them, are built the numerous villages and towns. It is in central Imerina that the population of the island is thickly set. There is abundance of food. The red hills offered, by their height, places of security around which deep fosses might be cut, or over which great cactus-hedges might be planted, for the terror of one's bare-footed enemies, and for still greater inconvenience to one's friends. The great plain is watered by numerous streams from the eastern hills, or from the volcanic district to the south; and however they score the valleys, or wind among the hills, or spread themselves out upon the level rice-grounds; whether the Mamba, the Varáhina, the Sisàony, the Katsáoka, or the Anjomoka; they all meet at last in the Ikiopa, and all find their way into the sea down its rocky ravines. We visited many of the upper waters of these rivers; we followed the rice-valleys, or came upon the scattered villages with their red-brick churches conspicuous for many miles. But there was one spot on which we looked with peculiar interest, the *Farahantsana*, or falls of the Ikiopa. It is a noble reef of rocks, which bounds one portion of the Imerina plain, and west of which the ground begins rapidly to fall. The river approaches the rocks sluggishly; through all the eastern plain it flows slowly, depositing its rich silt. Once over the reef, the waters boil and foam, and hurry away, against rocks and boulders, fast and furiously to the sea. That reef is the *saving barrier of* the country. Had it not existed, or had there been nothing in its place, during the long ages which have passed since the plain rose out of the sea, the fine soil now teeming with fertility would have been carried by the falling waters down into the plains, and the whole of Imerina would have resembled the scored and ruined districts in the province of Menabe. A similar reef at Sinjoarivo retains the waters of the Onibe; and yet another, the winding stream of the Manântanána, in the great rice-plain of Ambohimandroso. Nothing but these rocky barriers has secured a quiet resting-place for the rich silt and the fertilising water at the height of 4000 feet above the sea.

Bordered by grand hills of varied forms and studded with hundreds of villages and towns, Imerina is in many respects one of the most beautiful and picturesque provinces of Madagascar. Here it is gay with the brilliant green of the young rice; there it is shaded with dark patches of wood around Naméhana and Ilafy. Here it shows the great turtle-head rock of Ambátomaláza, or the lofty towers of the Three Sisters; there the long slope of Fandravásana, the lofty peaks of Antongona, or the towering masses of Ankáratra. Here lie the broad waters of the Queen's Lake, with its little island embowered in trees; there stand conspicuous clusters of villages, with their neat huts, the green ramparts of Ambohidrapeto, or the towering Amontana tree of Ambohidratrimo. It is impossible to survey the wide-spread scene from the lofty hill of Antanánarivo without feelings of exhilaration and delight. We know the golden glory which at sunset lights up the snows of Switzerland: but nothing can exceed the sharpness of the light as it plays over the landscape in the crisp, clear air of Madagascar after refreshing rain; and no pen can describe the deep golden blush which beautifies the red hills with an unearthly radiance when the autumnal sun sinks calmly to rest. Day after day, from the terrace of my Madagascar home, I looked with feelings akin to rapture on that wondrous scene; for I saw on every side not merely material beauty—the grace of form, rich tones of colour, or even the bountiful supply for a people's wants,—I saw the proof of a young nation's progress: new houses rising in the villages; new homes of better pattern for the richer classes. I saw the fortressed hills deserted for the open plains; peace, security, and mutual confidence, where once prevailed intestine war; I saw the new schoolhouse and the handsome church instead of the rush-buildings of five years ago. I saw that men were living in truer fellowship with men; because all together were striving to rise higher toward God.

Over all the higher portions of Madagascar, and far into the lower plains, the chief constituent element is gneiss or granite. Whole ranges of it appear on every side, and the enormous gneiss boulders scattered over the hill-sides form a conspicuous feature of the landscape. In certain districts the primitive rock is a fine felspar granite, of a delicate rose tint; these granite ranges were the noblest rocks we saw. In one valley this granite took the form of graphite, and, as usual, the square crystals of felspar presented a singular resemblance to Hebrew writing. Connected doubtless with this extensive felspar element is the profusion of red clay which strikes the traveller wherever he goes. It forms enormous hills; it has buried and covered in innumerable boulders; in various valleys and cuttings it is hundreds of feet deep. At times it is stiff and strong, at others it is full of fine sand; and when once water gets into it, whole hills are washed away into the lower valleys. Nowhere is this feature so conspicuous as in Ankay. Again it is hard and gritty with coarse sand. It naturally follows, that, on the whole, the soil of Madagascar should not be fertile, and that where the hard winds have hindered vegetation, and the rains have for ages washed away the salts of the soil, it is hard and poor. Only in the bottom have the finer constituents remained, and these, enriched by decayed vegetation, are universally appropriated to rice. All over Imerina, in many localities, are seen banks and hills of mica-mud.

There is one notable exception to these formations. The central province of Madagascar has been the scene of volcanic eruptions on an enormous scale. Twenty miles to the south-west of the capital is a fine group of mountains, the lofty peaks of which stand conspicuous in fine weather against the clear blue sky. These are the Ankárat Mountains. From a distance the mass is seen to be broad, to rest on an enormous base, and, when measured, it turns out to cover a space of 600 square miles. From the Imerina plain, 4000 feet high, the traveller rises steadily to 6000 and 7000 feet before he reaches the foot of the great central peaks. These occupy a space of 54 square miles. They are five in number, with minor elevations around them. M. Grandidier refers especially to one of them (Ambohitrakoholahy), and calls it the highest; but, owing to the mists, he failed to ascend and ascertain this for himself. We ascended two, measured a third by the theodolite, and eventually our native assistant measured all five. Their heights range from 8000 to 8950 feet, and they are the highest mountains in the island. They are all of volcanic origin, and though we saw no distinct craters, we observed that they were covered with broken lava, and we traced the streams of lava flowing from the centre on every side. Near their feet on the east are other centres of volcanic outflow and great lava-hills. On the south these streams run out for 25 miles. On the west and north also the long tongues of lava can be traced far into the plain; and it was exceedingly interesting to note both the lines on which the lava and the clay lay distinct, side by side, and the sections of the lava strata, through which some stream or road had cut its way.

But this was not all. On reaching the neighbourhood of Lake Itasy, 40 miles west of Antanánarivo and 25 miles beyond the central mass of Ankárat, we at once found new traces of volcanic agency; and when we ascended the lofty hill overhanging the western end of the lake, crater after crater met our astonished gaze. Some were of enormous size, some were small; some were lofty, others were low; some were cones, others were hollow, or were horseshoe in shape, and had long ridges of lava running out from the open side. In several cases the ridge was double. Their forms were beautiful, and the sides of most were richly clothed with grass. We spent several days among them, ascended the highest and most central, Ambóhimailála, and carefully mapped the district. There were forty craters in all, of which we were sure; we think there were others beyond to the north. In the midst of the group were little lakes and pools of water, and one charming piece of water, Lake Kazamba, which we have reason to think no Englishmen except ourselves have seen. Lake Itasy, which is on the eastern side of these volcanoes, we have mapped for the first time. This lake, we saw, has been formed by the elevation of the land and the outflow of the lava-streams. At the western end it looked shallow; the fishing showed it to be shallow, and the ground around it was very swampy. Toward the east, where its chief feeder runs in, the water is deep. It is not a ravine, with some natural barrier at its lower end; it is a submerged level. Many streams flow into it from the country round, and it has only one outlet, on the north, through the northern portion of the volcanic district. The lake is eight miles long and 2½ miles broad: it contains six little peninsulas jutting into the water, one of which is called Ambonihazo, "wooded hill," a pretty spot, with a little village and its pretty church embowered among the trees. Fifty miles further south we came on the volcanoes again. We had observed three groups of them out on the western plain; but when we reached Betafo and examined the district carefully, we were more astonished than before. We climbed a lofty rounded hill, called Ivoko, which we had seen twenty miles away, and duly noted, *and then found that* we were on the crater wall. The inner hollow was a quarter of a mile wide, the height of the wall above the level country outside was 1100 feet; two lava-streams went out toward the south and west; three small craters were at the foot, and others, large and conspicuous, were around us on every side. Close by, another huge crater, Iatsifitra, had its opening toward the north, and the lava that had issued from it was fresh, black and sharp, as if broken yesterday. But, stranger still, at its eastern side was a plain, a mile square, covered with heaps of lava, like stone cottages, fortresses, ruined palaces. I counted thirty greater piles and noted numberless smaller ones: it was clear that, like the Phlegræan fields in Italy and the neighbourhood of Mouna Roa in Hawaii, at one time the entire plain had been on fire, that a hundred jets of fire and flame and molten lava had spurted from its surface. The heaps were now old and moss-grown; but one of the peasantry informed Mr. Sewell that there was a kind of tradition amongst the people that their ancestors had seen these flames bursting forth. The newest lava was on the western side and near the crater. Travelling further east, round the southern foot of Ankárat, we had the lava still—long tongues, cinder-heaps, and old craters again and again; and having ascended one of the noblest hills of the country, the conical peak of Votovorona (a most important station in our survey), we found it volcanic also. Another fine cone to the eastward, named Ihankiana, was volcanic too. Altogether, in that important journey, we saw and counted 100 extinct craters, extending over an arc of 90 miles, not reckoning the central mass of Ankárat, round one side of which that arc bends. The volcanic belt is continued to the northward in the great hills with which the island terminates. The hill of Mataola, Mount Amber itself, the island of Nosibe, the island of Mayotta, the island of Johanna—these (as our eyes have seen) are all volcanic. The range over which the volcanic area is spread is enormous. What a mighty upheaving force must have been exerted over this vast space! Does Java itself show a nobler volcanic field? If human eyes could have beheld and appreciated them, what a scene of indescribable grandeur must have been presented when these volcanoes were active; when the land was rocked with earthquakes and the great hills of gneiss and granite were rent in pieces; when vast showers of blazing rocks shot out, like meteors, into the lurid night; and when the molten lava-streams poured, like rivers, out of the mouths of these flaming furnaces! Wonderful in the history of the earth has been the agency of fire: nowhere could that agency have been exhibited more grandly in the present age of the earth's history than on the great volcanic field of Madagascar.

Among the adjuncts of the volcanic field we found four hot springs, three of which are near together in Betafo and Sirabé. The temperature of the spring at Betafo, as tried by Mr. Cameron, was 130° Fahr., and the water seemed perfectly tasteless. In three places we also found jets of carbonic acid gas. Beneath the broad plain of Sirabé, extending over fifty square miles, there is evidently a great deposit of lime: the pits of Sirabé supply most of the lime used for building in Imerina and the capital. With the exception of some lime-deposits north of Ankárat, and a little sandstone in the Betsileo, they are the only secondary rock we found in all the higher parts of Madagascar: no fossils have been found in it. It is from this lime that the wells of carbonic acid gas are derived. One well, with numerous jets, was connected with a filthy mud-pool: the water boiled all over the surface, and the natives could not imagine why it remained quite cold. In a second case the tubular well was dry, and we found butterflies and various insects lying dead around the mouth: we were told that frogs and mice also are at times found dead there. Among the lime-pits the bubbling springs are numerous. A huge tufa-rock has gradually risen at one point, with stalactite caves in its sides, and on the top of the rock a hollow basin has formed itself; water from the rock flows up into this basin, bubbling as it rises, which is neither more nor less than natural soda-water, of which we could drink as much as we liked without charge.

During our journey we looked everywhere for columnar basalt, but failed to find it. We saw abundance of surface-lava broken in pieces. In a cutting at Betafo we examined a variety of strata, the result of repeated eruptions—strata of black volcanic earth, of brown earth, strata of ashes many inches thick; but of columnar rock there seemed to be none. At last we found a single patch of it: it covered a space of 30 feet by 20. The columns were, as usual, six-sided, and the pillars exposed on the edge of a little ridge were four feet long.

A last point to notice in connection with the volcanic district is, that close to that field—indeed enclosed by it—we found the noblest mass of granite rocks which we saw north or south in Madagascar. This great mass is termed Vavavato. It consists of several lofty ridges parallel to some degree with one another, yet starting from one northern point and curving, pear-like, round to the south. Some of the ridges are quite closed at the south end and form a *cul de sac*, whence the name is derived. The ridges are lofty, their summits serrated, and the separate rocks and masses are truly grand. Between the second and third ridges the fallen boulders are enormous and countless. On the third ridge are the highest peaks, with distinct names. At the north end one group of rocks has a wonderful resemblance to an elephant: it was conspicuous over a vast extent of country, and appears repeatedly in our station lists. A smaller elephant is close by. The granite of these rocks is well formed, and the felspar, in the best specimens, is of a pale rose tint: the grain is blackened by the sun; it is very rotten, and falls of rock must be numerous—hence the multitude of boulders on every side. A portion of the same ridge we saw far to the north. Another noble mass is Ibety, south of Sirabé; and another ridge of great length, Kipaséha, was the last of the western mountains which we saw at the extreme south of the Betsileo province.

In Imerina the higher plateau has a breadth of 80 miles. As we travelled south we found it growing narrower. At Sirabé its breadth is 60 miles. All down the Betsileo province it narrows still; and at Imahazony, on the line of 22° s. lat., as we stood on the top of Kirianga, we were in sight of both bordering lines of hill on east and west, 35 miles from each other; and the ridges immediately to the south of us crossed the country like a lofty wall, covered with forest, and fairly united the two. The Betsileo province, so far as we saw it, is clear of volcanic influence. It contains long gneiss and clay ridges, which cross it from N.N.W. to S.S.E. Near Fianárantsoa these ridges lie close to one another with but narrow valleys between; and in certain localities the massing of the mountains is very grand. On travelling from that town southward, when we pitched our tents in the broad valley, near the little village of Ambalavao, we had some noble masses overhanging us to the west, while the grass on the lofty eastern hills was all on fire, and long curving lines of flame served both to show the form of the hill and to light up the darkness of the night. On the east is an enormous hill of gneiss; a few miles further to the south-east, where the forest ridge begins, is another mass nobler still, called Ambondrombe, which is believed to be the entrance to the spirit-world. On the west again the hills seemed to increase in vastness and in number. Below the plateau were the noble rounded hills of Iandraimbáki, the high peak of Iody, the curving ridge of Kirianga; while outside them all, on the edge of the lower terrace, was the lofty, serrated granite ridge of Kipasèha, stretching away to the southward for thirty or forty miles. The vast bay formed by these wonderful mountain masses contains the broad green plain of Ambohimandroso, rich in rice, and supporting a large population. *What lies beyond* these hills we longed to learn; but our time was gone: we had accomplished our work in the south, and we were compelled to return to the capital. But we had traversed the whole of the well-peopled plateau which forms the crest of the island as far south as lat. 22°; and, with the help of Mr. Cameron, we had made so complete and connected a series of observations, that without difficulty we could connect the new province with the positions which Mr. Cameron had already laid down in the old. In our survey we had now secured two fixed points of great value.

Mr. Cameron, after careful observations, had placed the capital of Madagascar in lat. 18° 55′ 50′ s., and in long. 47° 48′ 40″ E. M. Grandidier (judging from his map) places Antanánarivo in lat. 18° 55′ s., and long. 47° 32′ E. The latitudes of the two observers are the same; but there is a difference in the longitude of 16′ 40″, or 18·05 English miles. Mr. Cameron places the capital 89 English miles from the eastern sea, M. Grandidier at a distance of 107 miles. My own view of the matter, from the time occupied in the journey, is that the former distance is too little, the latter too great. I am content to take the mean of the two sets of observations, and place the capital in east longitude 47° 40′, or at a distance of 98 miles from the sea. Mr. Cameron assents to this suggestion, until by further observations with his new chronometer he is able to determine it more exactly.

Mr. Cameron again places Fianárantsoa, the capital of the Betsileo province, in lat. 21° 27′ 10″ s., and long. 47° 18′ E., *i. e.* 66½ miles from the sea. M. Grandidier's are lat. 21° 27′ s., and long. 47° 3′ E., and 83 English miles from the sea. The latitudes of the two observers coincide; the longitudes again differ by 15′, equal in that latitude to 16·41 English miles. Both place the town of Fianárantsoa, a distance of 29′ or 30′ in long. west of Antanánarivo. In relation to each other, the two observers almost perfectly coincide. Mr. Cameron communicated his observations about Antanánarivo to M. Grandidier; but in regard to Fianárantsoa they are wholly independent; and the fact that they so agree furnishes a strong presumption that, in relation to each other, and to their component parts, these two important provinces of Madagascar are correctly laid down. Having worked out the set of angles myself, I find my own scheme accord with theirs: but, as before, I prefer the mean of the two longitudes, and would place Fianárantsoa in long. 47° 11′ 30″ E., at a distance of 75 miles from the Indian Ocean.

The Betsileo province has many features of grandeur and beauty about it; but its fertile and well-cultivated spots are few. It contains five districts: Ambositra and Ambohinamboarina, the Isandra, *Ilalangina, and Iarindrano.* In the political survey of the country, it is usually described as within the Matsiatra or beyond the Matsiatra. The Matsiatra is its principal river, and it is well fed by numerous streams, which rise from the granite and gneiss hills. The water is abundant, and is very pure. The most southern district is termed "Iarindrano," "full of water," and well deserves its name. It has one special river, the Manantanana, which rises in the hill of Ambondrombe, and makes its way sluggishly across the clay plains to the west, until it finds an outlet north of Iandraimbaki, whence it falls into the Mozambique Channel. Smaller rivers, like the Ranofotsy, join one or other of these. The chief feature of the cultivation in the province is rice; and the ingenuity with which the peasantry appropriate the water to its sustenance deserves high praise. The well-watered bottoms are few and not wide-spread. But the people terrace the hills; they track back the streams and rivulets step by step, till they reach the fountain; and thus the terraces may be seen beautifully levelled high up the hill-sides, and carried into every hollow, whence the water comes; each streamlet does duty many times over. Very pleasant to the eye are these bright terraces when the rice is young. Very rich in rice is the basin of Ambohimandroso, and the valleys near; green are the fields of Ikala and the bottoms around Ambohinamboarina; but nothing can exceed the skill and care expended on the deep amphitheatre of Nandihizana, in which the terraces descend step by step; and a lavish supply of water from three streams, and the forest near, covers them with a golden harvest, which feeds thousands of human beings. Wherever there is water, the peasantry plant rice. But they place their houses, not in large clusters, in villages of 100 to 500 people: they prefer little holdings, called *válás*, of two, three, or four huts, each set surrounded by a clay wall and a cactus-hedge; and in the absence of wood, which will not grow in the hard, foggy climate, the eye rests with pleasure on these green rings which dot the hill-sides, or the higher ridges overhanging the broader levels, where the rice-plant grows. The productions of the country, as shown in the markets of Fianárantsoa and Nandihizana, are not numerous. Rice, manioc, Indian corn, beef, pork, fowls, a little honey, lambas made of rafia-palm fibre; a little coarse silk, coarse but strong spades, timber rafters, spade handles, thick, clumsy window-shutters, with the hinge projecting above and below, grass baskets and earthen plates, these are the chief articles exposed for sale.

We were disappointed as to the population. We had always read of the Betsileo that they were a million and a half in number. As we traversed the country, and saw how empty it is, we asked again and again, where are the people? In a few broad basins, a few opened and well-watered valleys, are built a few towns of 150 to 300 houses. All the rest are villages and "valas." Only Fianárantsoa has 5000 people, including the Hova garrison. The Government reckon, in all the Betsileo and Tanala provinces and their various districts, 50,000 *hetra*, or farmsteads, great and small. This would indicate as many families, even allowing for changes since the arrangement was made; and that calculation would make the population 250,000, or not more than 300,000 in all.

The population of Imerina has not, I think, been overrated; but it has not been reckoned very high, and has been usually regarded as 1,000,000 in all. The province, as I have mentioned, may be reckoned at 110 miles long, and 90 miles broad; or about 10,000 square miles. The entire border is thinly peopled: large tracts of hilly country, of high barren moor, or of bare red clay, have very few villages; those which exist being found in scattered valleys, sheltered from the cold winds, or possessing rich land in the bottoms. The well-peopled portion is 50 miles long and 25 miles broad, or 1250 square miles in all. And here the villages are crowded together; all the best lands are carefully cultivated, and the prosperity of the province is patent to every eye.

Numerous as the villages appear, the population still is limited. The best towns are not large. Antanánarivo leads off with 80,000 people. Ambohimanga has about 5000; one or two other towns have the same; and a few others have from 3000 to 2000. Half of the ancient capitals, the "twelve sacred cities," on "the twelve hills," are in a state of decay, and their population is small. To set the Imerina population at 1,000,000, or 1,200,000, falls in with the general Government calculation and the demands made for feudal service. We must add 100,000 for the Imamo and Mandridrano districts in the south-west, and another 100,000 for the Vakin-Ankárat and the thickly-peopled valleys of Betafo and Sirabé, which have 10,000 *hetra*. Thus for the entire of the two principal provinces of the island, Imerina and the Betsileo, with all their districts, enclosed within no-man's land on every side, we have a population of 1,700,000. Several circumstances confirm this calculation, into which I will not enter.

Our fourth journey from the capital was directed to the Sihánaka province, a hundred miles to the north. Five years before it had been visited by one of our missionaries, and M. Grandidier had also been there. But we could get no information whatever concerning it. Where were the stopping-places? Where was the population? and what was the character of the country? To these points we could find no answer. Our predecessor had left no road-bill; and M. Grandidier has published no particulars, except in the section of the general map which relates to the district. The result was a strange experience.

We had left Ambohimanga, had given our men their mid-day meal, and were still in sight of the capital, when we suddenly found ourselves in a district without inhabitants. Towards sunset we reached A'tomainty, a village of twelve houses, in which our sixty men found some kind of accommodation; we ourselves slept in our tent, eleven feet square. For many hours the next day it was the same: we saw three villages of two houses each; and then reached a fertile basin, with several prosperous villages and Christian churches. The principal of these was Anjojorobe. Sunday past, and our men rested, we went on our way. In a few hours we climbed a fine ridge covered with wood, and found ourselves on the edge of the Imerina terrace. The pass crossed over the highest part of the ridge, and for forty yards went along a narrow ledge two yards wide, which had deep ravines on either side. It then descended on the east by huge natural stairs, and passed up and down clay hills, through dense forests, and down a richly-wooded ravine. The pass is expressively termed Ambárabáramváto, "the stone gateway." It was late in the afternoon before we found a resting-place where our men could breakfast. The name of the village, with its twelve houses, was *Mandanvatsy*, i. e., "Get your tiffin" before going farther; intended as advice to Sihánaka travellers going the other way—and good advice it is. For three days we journeyed through an empty land, the upper portion of the district of Ankay, sleeping in our tent; at the end of the third day we reached the town of Ambatondrazaka, the capital of the Sihánaka province, and on its south-eastern edge. From the governor and his officers, from the Christian people around him, and then from the congregations in all the principal towns and villages, we received a warm welcome. Only once had they seen an English missionary among them, and that was (as I said) five years before. Turkeys, geese, fowls, eggs, rice and milk, were placed in abundance at our command. Every day we had one ox given to us, and on one day we received two. Our men failed wholly under this prosperity, and were demoralised by the plenty they enjoyed. We found that in its general structure the Sihánaka province is a vast basin in the midst of hills, and having a clear lake and enormous swamps in the centre. The hills cross the country in parallel ridges at an angle of N. 16° W. The *water is still high* in the basin, and on three sides touches the foot of the hills; in consequence, whenever we passed from one ridge to another, we had first to wade through the swamp lying at the foot. For miles upon miles in the open centre, as well as up its many arms, the swamp is beautifully green. Two water-plants grow profusely there, the *zozoro*, a solid triangular papyrus-reed, sixteen feet high; and the *herena*, a flat sword-blade, which reaches six or eight feet. Often the men made a passage for themselves over the deep water by beating down and walking over the stalks of these noble reeds. Here and there the process of recovery and reclamation has begun, and round the edge of the district rice-fields have been cleared and planted, and villages have been multiplied. In the centre of all, though lying nearer to the eastern shore than the western, is the fine lake of Alaotra. In the northern portion it is perfectly clear of reeds, and its waters run close up to the enclosing hills; in shape it is hammer-headed, and its single outlet is at the north-east corner, where the River Maningory rushes down a rocky valley to the sea. The lake is 34 miles in length, and is four or five miles broad. We enjoyed a fine view of the lake from the hill on its eastern side and the village of Ambohitsoa. As we looked on its clear blue waters stretching away to the south, stretching into the north, and running in among the hills; as we saw it in the distance bordered with the green field of reeds, spreading out many miles to the west, and on every side backed by massive hills of varied and graceful forms; here showing the bare rock, there the red clay, there covered with dark wood, while over all was the clear pale azure of an unclouded sky; we thought we had seen few fairer sights in all Madagascar than the landscape at our feet.

The population of the entire district we estimated at 40,000 people. Two towns are of moderate size; the rest are but villages. The more we thought it over, the clearer it became to us that the people were Betsimisáraka colonists from the eastern coast. They had found their way up the rugged valley, the outlet of the waters; they had seen the fair land above the pass; they had found it empty, and then they invited their friends to come and take possession. It is all around this north-eastern portion that the population is most numerous. We saw the hill where their first chief had settled, Ambohitrandrian, or "King's Town." We noticed that their houses were Betsimisáraka; the hair and ornaments of the women were the same. And that, while on the north they have links of connection with the coast, especially with Fenoarivo, they are quite cut off from the Imerina population on the south. After their last *village of Mandanavatsy*—and the great wall of rock—the first population met with above the hills is Hova, a colony from Ambatoména; below the hills it is Tankay, and is connected with Bezanozano, with Moramanga, and the Tanala. Why, then, did the Betsimisáraka colonists change their name? They did so for a very simple reason, derived from their new position. The word *hánăka* is an old Malagasy word for "lake:" *si hánaka* denotes many lakes and pools. They gave this name to their new home, and a perfectly true designation it is; and for themselves they became Antishánăka, that is, "the Lakers," "the Betsimisáraka of the Lakes."

The lake country has an area of 2000 square miles; the district being about 60 miles in length by 35 in breadth. It is pear-shaped, the thick end lying to the north. The map we have made of it is original, and is the result of two separate sets of cross-bearings; most carefully connected with our previous survey by an observation of no less than nine principal stations among the Imerina hills. One set was taken by the Rev. J. Sibree, who is a practised surveyor. Our earliest observations were peculiarly happy, as also were the last. In working out the two sets separately, it was plain that the positions laid down by M. Grandidier in his general map did not coincide with ours: he places the whole district too far toward the west.

Another fact of interest is this. All up the northern portion of the Ankay three of the great parallel lines of hills along the island are seen to approach one another. The western line keeps quite distinct to the northern border of the Sihánaka; the two eastern chains (the one the eastern wall of Ankay, and the other apparently the terrace-wall of Beforona) approach one another; and the result is a perfect sea of hills and clefts, and valleys, which only photography can faithfully portray. The material is a vast sedimentary deposit of red clay, with abundance of sandy elements having little cohesion. Storms, rains, waterspouts, have acted upon it, and the material has given way in all directions; has been scored into thousands of gullies; has been swept into the bottoms of the valleys, especially along the Mangoro; or has been carried to the sea. I need scarcely say what a difficult country we found it to climb. The clefts of Ankay were about 150 feet deep.

Our last journey was also over a country perfectly new; untrodden (so far as we know) by a single Englishman till our friend Mr. Maynard took it, at our instance, three months before ourselves. The direction of the journey was N.N.W., which is the course taken by the Ikiopa and Betsiboka rivers, into which the province of Imerina is, to so large an extent, drained. It extended a distance *of 230 miles,* and occupied us sixteen days. We travelled, as before, with our tents and canteens; but, with our baggage for the voyage home, our bearers were unusually numerous, and they made up their minds beforehand to make a good thing of the trip at our expense.

The descent by this route from the plateau of Imerina to the level of the sea is, in its upper portions, more gentle than on the east coast. We may reckon four or five broad terraces over which the road passes; the fall in the ground is moderate from one to the other; the path, as a whole, we found one of the easiest in the island, though the bearers complained that at certain parts the sharp quartz gravel cut their feet.

The first portion of the journey traversed the district of Vonizongo, which lies north of the parallel hills among which the Ikiopa runs, and is shut in by the great gneiss ridges of Lohavohitra and Ambohimanga. The southern portion of Vonizongo is full of valleys cut out by the streams from Lohavohitra, and is rich in water and its offspring, rice. The north has high bleak moors, among which are several beautiful valleys. The villages are numerous, and the people have a strength and independence of spirit which have made them brave soldiers, good citizens, Christians of high principle and faithful martyrs.

Descending the moors by an easy pass over a red clay ridge, we went down into North Vonizongo, a valley 25 miles long. Enclosed by two lines of hills, east and west behind these hills, are broad clay moors, scored in all directions by the running waters, and all drained directly or indirectly to the west and north. The population became thin, and we could count every village as we went along. At the north end of the western line of hills is a noble hill of gneiss, Angávo, which gave us one of the boldest precipices we had seen in Madagascar. The waters had circled around it down the valley, and had cut out a vast bay in the clay deposits at its feet.

On one of these clay hills is the pass of Ambatomena ("red rock"), which gave us a second descent of 800 feet, on to the second terrace. This terrace was 48 miles long, and had a steady fall to the northward. It presented two parallel valleys drained by a stream, called "the wooded river" (Mánankázo), with great hills on the west; and it contained in a line, five little towns, which are the Hova military posts. These posts serve (1) to maintain communication with the country to the north; (2) to protect the cattle herds, which feed on the unowned pastures; (3) to ward off the possible attacks of the Sakalava tribes who must enter North-west Imerina by this road. We found the people hospitable and kind;

very glad, in their extreme isolation, to welcome a friend; and saw among them intelligent and earnest men and women, truly anxious to live thorough Christian lives. Toward the north of this section there were some noble hills; one of which, Andriba, separated two level and fertile basins, containing several villages, and presenting some beautiful clusters of the rafia-palm. Between Kinajy, the first of these posts, and Malatsy, the last, the ground had fallen 1350 feet.

We had now finished the inhabited country, and were on the edge of a broad district, literally "No-man's land." Our bearers had many fears of robbers, enemies, and Sakalávas. At the last village they cleaned abundance of rice, polished and sharpened their spears; and were greatly comforted in their minds when Mr. Jukes's empty gun was fastened outside one of our cases, and were told that, while Mr. Pillans headed our cavalcade, Mr. Jukes and I intended to bring up the rear. It took us two long days to cross this unoccupied territory, which had a width of some fifty miles; and they were days of great enjoyment. The country was perfectly wild: it presented to us long ridges, falling lower and lower, and becoming fewer; trending off to the north-east, and leaving a broad rich plain clear to the sea: it gave us long valleys, green with small vegetation, and well watered by small streams. During the first day, in a north-west course, we followed first one stream and then another, and crossed the low ridges between them. At night we pitched our tents on a pretty terrace above the River Andranobe; our bearers lit their fires upon the sandy bed. During the entire day we had seen scarcely a living thing—the silence, day and night, was most impressive; and it added to the charm of our position, that, as the full moon rose in the east, the whole body of our bearers gathered around us for evening prayers, said a hearty Amen to the 91st Psalm, and sang their plaintive Malagasy hymns. Let none think that the days of romance have passed away: to me the realities of life are often more romantic and exhilarating than anything which fiction can invent or describe.

The second day of our wilderness journey, we breakfasted by the light of a brilliant moon; and, as the sun rose, we came down over the edge of the hill-country, upon the River Ikiopa. It had been skirting our road all along, a few miles to the west; it had been turned towards us by hard gneiss rocks; the long bend, at which we struck it, was full of green islands; and the river, a beautiful sight, was falling in creamy masses over a noble cataract, half a mile broad. Sixteen miles below, the islands diminish in number, and at the town of Mevatanána the river becomes navigable for canoes. We now travelled inland, parallel to the river, and for several hours found no water. For many miles we traversed a wilderness of rubbish—the gneiss strata were tilted perpendicular; gravel and silt, silt and gravel, were spread out on every side, and great boulders lay half-exposed, half-buried. The reason was simple. This plain lay under the hills just where one of the great drains of the country had, for countless ages, deposited its stolen treasures. What the mighty earthquakes to the southward had rent and riven and overthrown—waterspouts, and storms, and floods had washed into these lower plains. In the afternoon we reached Mevatanána.

We were now approaching the sea-level; from this point on the river our barometers fell 150 feet. Bembatooka Bay was yet 85 miles away; but the stream was rapid till we met the tides. For our further journey we hired canoes. At the end of the first day (Monday, August 3rd), we reached the junction of the Ikiopa and Betsiboka rivers; and pitched our tents on the sand-bank thrown up when the rivers are full. To us the spot was full of interest. In our travels among the Imerina hills, we had traced and mapped many of the head-waters from which these rivers had sprung. In the moor, near Angavokely, we had seen the fountains of the Mánanára, the Tsárasáhatra, and the Ikiopa; in the forest were the springs of the Varahina and the Sisàony; on the east of Ankarat were the Katsaoka and the Andromba. We had traced them over large tracts of country: here we saw their junction; and their united streams would bear us to the sea. The country was, in general, level, but it was covered by a few ridges through which the river cut its way. It was fresh and green everywhere. The air was warm and the vegetation largely tropical. Around us were grassy plains, gardens of plantain-trees, abundance of reed, and of the bamboo-cane with its spiny leaves and feathery crown, while great tamarind-trees, huge mango-trees, or a few palms, stood out upon the undulations, or shared in the forest which clad the dark hill-sides. We now saw more animal life than in any other part of our travels. There were numerous small birds of gay plumage, blue and green; large flocks of wild ducks, small flocks of the paddy bird, the little white stork; now a heron flew up from the green brake; now we saw the flamingo fishing in the stream. But nothing could compare with the crocodiles. From the time we took to the canoes we began to see them: first in twos and threes; then in sevens and tens; at one time families of ten and twelve, and even twenty, were grouped together, sleeping in the sun; and at last, spread over a spit of *sand, we found no less than forty.* When we took to counting, this was the result. During the first hour we reckoned 105: during the next half-hour we reckoned 102; altogether, during the four days, we must have seen between 1600 and 2000 crocodiles. Some were babies, but some were of enormous size, full 20 feet long, the knobs along their back forming large protuberances, and the girth of the body being very large. But they are timid, and, when woke up from their lazy sleep, at once went and hid themselves in the water. We were told that they find abundance of fish in the river; they watch cleverly for the cattle when they come to drink, and they are destructive also to human life.

The rich and fertile district we were now crossing is occupied by a portion of the Sakalava tribes. They are not numerous: their villages are small and scattered. They live on fish, on rice, on their cattle, and on the produce of their plantain-gardens. They have few wants, and there is little trade. Mevatanána is the first of seven Hova towns, which are really military posts: they lie in a line along the river, and end at the port of Mojangá. We saw five out of the seven, and were most hospitably welcomed. At Mojangá we were picked up by the steamer *Malacca*, which had recently continued the line from Zanzibar and Nosibé, and soon found ourselves on the way to Zanzibar and home.

The Malagasy people who inhabit this island of Madagascar are a single race. They are divided into three principal tribes, occupying different districts. The Betsimisàraka occupy the east coast, the narrow plain between the hills and the sea; their towns are small. From Tamatave to Mananzári, the twelve chief towns contain only 2000 houses and 10,000 people; there are small villages besides: but I doubt whether over the whole 200 miles we have more than 50,000, and over the entire coast double that number. The Sakaláva tribes take the entire west side of the island: they are broken up into numerous sections, with only local interests; and they are constantly at feud with one another. M. Grandidier can tell us much about them, as he lived long in their midst, and suffered greatly from their plunderings. The Sakaláva tribes near the outflow of the Mania are the people who have plundered the Hova cattle, and against whom was recently waged a petty war. They hold no terms with the Hovas; while others to the west of the capital, and those to the north-west, have accepted the Hova rule since 1824, and live in peace.

The Betsileo tribe are thorough Malagasy, and are akin to the Hovas. The Ibara are allied to the Betsileo: like the Betsileo, they live in "valas;" they speak like them, and seem to differ from them only in the mode of dressing their hair. The Hovas are the ruling tribe, who occupy directly all Imerina, Vonizongo, and Imamo; and indirectly the Sihánaka district, the north Sakalavas, the Betsileo province, and Betafo. All these tribes speak substantially the same tongue, are of the same tint and colour—a light olive—and have much the same customs. Differences and jealousies have existed between them for many, many generations. These probably originated in the fact of separate colonisations; in detachments from alienated sections of the same tribe; or in separate settlements of men and families belonging strictly to the same race. Two elements have, however, entered among them from without. 1. Ages ago, the Phœnician and Arab merchants from the African coast began to visit Madagascar. Bembatoka was one of their principal ports, and specially they seem to have had a continuous settlement at Mananzári and Matitánana. They were the first who taught the Malagasy writing, and specimens of their Arabic Malagasy were secured at Matitánana by M. Grandidier. They taught the Malagasy the division of time by months; they gave them also the names of the days of the week—Alahády, Alarobía and Zoma: scales for weighing money are *mizán;* and doubtless from them they learned the rite of circumcision. 2. With the Arabs also came a slave-trade—from the island, to the island. In the course of generations thousands of Africans, Swahelis, and others, have been introduced into the island. The blood of many Hovas is mixed with African blood; the thick lips and the crisp, curling hair show it. There are also thousands of slaves in the island, pure Africans, as well as thousands of Hova slaves. With exceptions of this kind, which are soon accounted for, the Malagasy races are one. Their language is one—an offshoot of the Malay: a fact proveable by (1) inflections; (2) by the peculiar reduplications; (3) by special forms and uses of participles; and (4) by a multitude of the most important words.

As a people the Malagasy are not far advanced; their almost complete isolation from the world at large has greatly retarded their progress. They are thoroughly tribal in all their institutions still. They are clans in form, as well as in spirit. The Prince is their chief, officially the owner and lord of all they have and all they are. All obligations are paid by feudal service; officers are remunerated by lands, and by the assignment to them of the service of so many inferior men. No salaries have been paid in money till recently: everything has been paid in service or by gifts in kind. The hump of every bullock killed belongs to the Queen. Rice, sugar-cane, lámbás, fire-wood, cattle, stones, are all delivered as *part of that service.*

Things are far behind. But they are a kindly people, an orderly people, a loyal people, a religious people. They have a great affection for their Queen; and the Queen (who is an excellent Christian lady) has a warm affection for her people. An intelligent people—they have learned much from their English friends, and are improving daily. There are more than a thousand congregations among them; some three hundred thousand of them are more or less under instruction: and many thousands prove, by their example, that they are not only intelligent but sincere. I add this fact, because I cannot doubt that the Fellows of this Society care for the earth, its resources, and its form—not merely for itself, but because it is the theatre on which human character is developed, human events take place; and the tribes and nations, great and small, by which it is peopled, benefiting and blessing each other, work out the will of God respecting all.

The Paper will be published entire, with the author's Map, in the 'Journal,' vol. xlv.

The Rev. Mr. PILLANS, the travelling companion of Dr. Mullens, on being called upon by the President, said the range of mountains of Kipasèha appeared to be of a different character from the general ridge coming down the centre of the island. It was more jagged, as if the granite were newer. The granite of the district of Vavavato was also sharper, clearer, and more definite in outline than that of other parts, and about 30 or 40 miles north-west of the capital, near the district of Vonizongo, was a large tract of the same kind of stone. The great central ridge was really much nearer the east than the west side of the island. When travelling southwards, particularly towards the Betsileo country, they noticed on almost every summit of the lower hills, and on a great many of the higher points, the ruins of old fortified towns. Deep ditches were cut down into the clay to a depth of from 12 to 20 feet, and in addition to these there were sometimes clay or stone bulwarks built all along the hills, while the towns were only to be approached by tortuous ways leading through long lines of prickly pear, 15 to 20 feet high, to the three or four gates. It must have been a very difficult task for an enemy to force his way into these well-protected spots. The greater part of them were now, however, entirely deserted, the population having removed down to the open plain, where they lived in scattered villages and *válás*. In the beautiful valleys of the Betsileo country they preferred to live in little *válás*, surrounded by a very thorny shrub that the oxen could not touch. This change of habits indicated most clearly the alteration that had taken place in the country during the present century. One hundred years ago the whole island was broken up into about fifty great tribes; now they were practically united under one government, with a national sentiment, common interests, common enterprises, a feeling of loyalty, and the rudiments of what might fairly be called a public spirit—rudiments passing from the rudimentary stage into something that promised a great deal for the country. An army had been formed, and many difficult questions of labour had arisen. Service without payment still existed, and was exercising at the present time a most repressive influence upon all kinds of industry. If a person in the capital became a skilled workman, he would very likely keep that fact a profound secret; for, if it were known, *he would have* a great deal of work imposed upon him, which would bring him no remuneration. Social questions, therefore, were coming rapidly to the front. Some of the missionaries were placed in a position of considerable difficulty. They had stirred up the people to great enterprises, which had increased the labours of the poor, who, when large buildings were being erected, necessarily had to carry more wood from the forest, and burn more bricks; so that the English missionaries, who were doing such a noble work, were really in danger of being regarded as oppressors of the people. These, however, were but the difficulties of a time of transition.

Sir BARTLE FRERE said that, during the mission on which he was recently engaged on the East Coast of Africa, it was part of his duty to visit some of the north-western ports of Madagascar and the Johanna Islands, which, so far as could be judged from their geology and productions, in remote ages formed a portion of that great submerged continent which naturalists believed extended from the coast of Madagascar probably to the Malay Peninsula, and of which only a few peaks now remain at Mauritius, Rodriguez, the Seychelles, and so on. The animals found on these islands show that they belonged originally to an entirely different continent from either Asia or Africa. What he had himself seen of the north-west of Madagascar impressed him with the conviction that it was one of the most beautiful parts of the whole earth. He did not think anything in India could compare with the great bays of Bembatoka and Passandava, and the mountain masses to the north, which were visible from the sea-coast; while Johanna, one of the Comoro Islands, was certainly the most lovely spot he had ever set eyes on. It combined every beauty of outline, and colour, and apparently of climate also, and illustrated very remarkably all the characteristics of Madagascar. The Great Comoro was evidently connected with the volcanic system of Madagascar, and was still frequently active. Mr. Sunley, who resided at Johanna, told him that by the light of its eruption he had read small print 40 miles off at sea, in what would otherwise have been a dark night, and the whole side of the island, which was visible from Johanna, appeared to be one mass of burning lava; while, on revisiting a place at which he had been six or seven years before, he found that the lava had covered the spot and formed a projecting spur running ¾ of a mile into the sea. Everything connected with the fauna and flora of that part of the world was of the greatest possible interest; for remains were found of the plants, and birds, and beasts which must have existed in the great continent of which no historical records have been preserved. Colonel Yule, in his translation of 'Marco Polo,' alluded to the occasional finding of the remains of an enormous bird, which was supposed to be the Roc of Sinbad the Sailor. The eggs were many times larger than an ostrich-egg, and there were some specimens of the bird's bones in the British Museum. Numerous other fragments of what might be called this lost world, were still to be found; and Dr. Mullens had shown how, in the course of a tour made for other purposes, he found much, as it were, lying on the surface, which was of perfect novelty and the greatest possible interest. It was a curious thing that, until quite recently, less curiosity was shown by the English about Madagascar and its inhabitants, than was shown by our ancestors in the reign of Queen Anne. In almost all collections of voyages and travels, at the beginning of the last century, Madagascar and Johanna occupied a considerable space. Two or three of De Foe's novels had a great deal of their incident placed in Madagascar; and it was quite clear that he learned what he there described, from what were popular tales of the sailors of his day. Captain Kidd seemed to have made the coasts of Johanna and Madagascar his home for many years, and the scene of his piracies; and probably it was a good deal owing to the way in which the people were then treated, that Madagascar remained, as it were, shut up until it was opened out to Europeans by the Mission with which Dr. Mullens was connected. The French had tried the experiment of gaining an entrance into the country by force; but, even according to their own confession, they signally failed. They, however, had settlements on the coast, where they carried on a good trade, feeling all the while the very greatest respect for the present Hova Government, owing to the spirit with which it resisted their attacks. The British Government had no particular call to conquest in that direction; but, about seventy years ago, an excellent Scotch gentleman was struck by the benighted state of the port at which he touched, and he drew the attention of the London Missionary Society to the island as a promising field for their operations. The revolution which had been brought about there by the missionaries of that Society was one of the most extraordinary that the world had ever known. Until his own recent visit to Mojanga, he had no idea of the extent of the change which had been wrought. He attended worship in one of the native chapels, where the Governor's aide-de-camp and son-in-law preached. The service was exactly on the pattern of a Presbyterian service in Scotland, and never, in Scotland or in England, had he seen a more devout and attentive congregation. All the congregation had Testaments, in which they found the texts (for there were two sermons), and the preachers showed not the slightest extravagance of voice or manner. The people had been taught to read and write, and the same process was now going on among them, which was described in the old Saxon and Norman and early English chronicles, as going on in our own land and in northern Europe—the same sort of teaching by religious teachers—the same instruction in the arts of life and the policies of civilisation. He had been struck by the extraordinary similarity of the people to the Japanese. A good deal was due to the likeness in figure, and visage, and the lank hair; but there was also much in their grave, solemn, persistent character, to remind one of the Japanese. The geographical details of a great part of the country were still unknown; and young men with leisure, or a spirit of enterprise, or a desire to study the process of civilising a savage people, could scarcely do better than pay a visit to Madagascar.

Mr. TRELAWNEY SAUNDERS expressed his gratitude as a geographer to Dr. Mullens for the model paper he had read. When Colonel Lloyd was engaged in constructing his map of Madagascar, the difficulties he had to contend with were extreme; and, so far as the interior of the island was concerned, he had to content himself with knowing that it was high land, and could ascertain no details about it. From that time until the present, no advance had been made in our knowledge of Madagascar. Two or three years ago he met an aged missionary who had spent many years in the island, but was unable to obtain from him the slightest information with regard to the geographical character of the country in which he had spent the best years of his life. The defect had now, however, been admirably removed by the exertions of Dr. Mullens and his coadjutor.

The PRESIDENT asked Dr. Mullens if he could give the Meeting any information with regard to the ethnology of the island. The late Mr. Crawfurd, who used to be called the "Contradictor-General," had a peculiar theory on this subject, which was in direct variance with that of Humboldt. He maintained that the original inhabitants of Madagascar were a pure African race, which had been to a certain extent civilised by stray and sporadic visitations of Malays. He also held that the language was essentially African; whereas Humboldt, from a very large field of induction, came to the conclusion that Malagasy, although not a derivation from Malay, was a cognate dialect. The Malay languages, although the Arabic characters were used, were Aryan or Sanscrit—Sanscrit only half-developed—and Humboldt found that all the roots in the Malagasy were the same as the roots in the Malay, and could be traced to Sanscrit sources.

Dr. MULLENS, in reply, said he could not say much about the nature of the

Malagasy language from personal knowledge, because Mr. Pillans and himself were only able to pick up enough of it to get on with their eating and drinking and housekeeping; but they found it rather an easy language for that purpose. On several occasions he brought the subject before the oldest missionaries, several of whom spoke the language with very great ease and fluency. During the last ten or twelve years, great advance had been made in the knowledge of Malagasy, and the missionaries were now engaged in looking into the question of its relation to the Malay languages. They had already noticed that a close connection existed between the Malagasy and the dialects of the great Malay tongue found in the South Sea Islands. The Maori of New Zealand, the Samoan of the Navigators' Island, the Raratongan, and the Tahitian, all showed a great similarity to Malagasy. One of the Church Missionaries, the Rev. Mr. Denning, on a journey from Mauritius to Japan, directed his attention to this subject, and he said there could be no doubt at all that Malagasy and Malay were one and the same tongue. They had parted from a common mother many generations ago, and were substantially the same. With regard to Mr. Crawfurd's theory of the African origin of the people, all over the centre of the island one great tradition prevailed among all the tribes, namely, that their ancestors were called the Vazimba. The tombs of the Vazimba were regarded as most sacred, and formed the model for the modern common tombs. The meaning of the name was not known. It was supposed that a portion of the Vazimba tribe still lived somewhere near the west coast. There was no evidence whatever that the main portion of the original inhabitants were Africans. The only African connection now discernible, was one on the surface. From the north-west a stream of Africans could be traced, and he attributed that to the slave-dealing propensities of the Arab merchants who had visited the port of Mojanga for many generations. There were many things which pointed to a belief that one of the voyages of Sinbad the Sailor (whether he was a real or only a typical sailor) had reference to Madagascar. On the southern terrace of the island, Grandidier found the remains of a roc's egg, which have been placed in one of the museums in Paris. The entire egg must have been large enough to contain a whole dozen of wine; but Professor Owen considered that the bird might not necessarily be of a proportional size, as little birds sometimes laid large eggs. There was no doubt a large admixture of Arab blood among some of the east coast tribes. The Arabs had done some good, but the great harm they had done was the importation of a large number of Africans directly from the African coast. The only African element in the island was manifestly imported from abroad.

Mr. DREW asked if the Malagasy language was written in Arabic or Roman characters?

Dr. MULLENS replied that the Arabic Malagasy was at the present time simply an object of curiosity. From the time when the missionaries first went into the island in 1818, they began to use Roman characters, by which the language could be expressed with great facility. The pronunciation of the vowels was very like Italian, and was very pleasant to the ear. The whole of the Malagasy literature was now in the Roman character.

Sixth Meeting, 8th February, 1875.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Captain Carl Alexandersen* (Imperial German Navy); *William Cotesworth, Esq.; Robert Johnston*, Esq.; Charles Rathbone

Low, Esq. (Lieut. late H.M. Indian Navy); *Robert Russell Maynard, Esq.; Thomas Mercer, Esq.; Captain William Neal; George Macartney Ogilvie, Esq.; Arthur John Robinson, Esq.; Thomas Russell, Esq.; William Frederick Schäfer, Esq.; Captain Francis Spry; C. A. Taylor, Esq.; Commander Buchan Telfer,* R.N.; *George Wray, Esq.*

DONATIONS TO LIBRARY, JANUARY 25 TO FEBRUARY 8, 1875.—Statistics of the Colony of Victoria for 1873, Part IX. (*The Australian Government*). The Austro-German Polar Expedition, translated from the German, 1875 (*Joseph Wiggins, Esq.*). H.M.S. *Challenger*, No. 2: Reports on Ocean Soundings, &c., 1874 (*The Lords Commissioners of the Admiralty*). Ueber die Art des Reisens in Afrika; by Dr. G. Schweinfürth, 1875 (*Author*). New Zealand Hot-Springs District: Letter from Hon. W. Fox, 1874 (*Colonial Office*). Selections from Records of the Madras Government, No. XLII.; Bombay Government, new series, Nos. CXL. and CXLIII. (*The India Office*). Bulletin de la Société géographique de Lyon, 1875, Vol. I., No. 1 (*The Society*). Arctic Experiences, containing Captain Tyson's drift, history of the *Polaris* Expedition, &c., edited by E. Vale Blake, 1874 (*Editor*). E. E. Middleton's New Process of Measuring the Height of the Sun, &c., 1874 (*Author*). And the current issues of corresponding Societies, &c.

DONATIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF 25TH JANUARY, 1875.—Map of the West Coast of Central Africa, from the Gaboon River to Loando. Map of Chile; 2 sheets. Map of Dr. Livingstone's Routes in Central Africa, 1866-1873. Plan of the Royal Castle of Wilhelmshöhe (*Dr. A. Petermann*). Part No. 5 of the Historical Atlas of Ancient Geography, by Dr. W. Smith and G. Grove, Esq. (*J. Murray, Esq.,* F.R.G.S., *Publisher*). 2 Admiralty Charts, viz.: 444, Port Xagua, West Indies, and 1345, St. Jean de Luz, France. Index sheet of published Admiralty Charts of Coast of France, Spain, Portugal and Mediterranean. U. S. Hydrographic Office charts of the discoveries north of Smith Sound by the U. S. ship *Polaris* (*Captain F. J. O. Evans, Hydrographer*). 64 sheets of the Government Survey of India (*Secretary of State for India in Council*). Ordnance Sheets of the Parish of Pett, on 2 sheets (*Sir H. James, Director*).

HIS ROYAL HIGHNESS THE PRINCE OF WALES attended the meeting.

The PRESIDENT, in opening the business of the evening, alluded to the crowded state of the meeting and the number of distinguished personages present. He believed that this testified to the warm interest felt by all classes in Arctic exploration. The Royal Geographical Society took some credit to itself for the share it had had in bringing about the new Expedition, the route of which was to be the subject of discussion that evening. In spite of opposition, in spite of discouragement, in spite of the still more fatal impediment of indifference, the Society had worked long and earnestly, always keeping that one object in view. At length they had succeeded, and it was now only fair that the services of those who had borne the brunt of the battle should be known and recorded. In the first place, he would refer to the most valuable assistance that had been received from Admiral Sherard Osborn, whose absence on the present occasion, caused by two deaths in his family, they all deplored. Just ten years ago, Admiral Sherard Osborn read a very interesting paper before the Society, in which for the first time he pointed out the advantages of attempting to reach the Pole by way of Baffin's Bay and Smith Sound. At the same time he explained the very valuable scientific results which might be hoped for from such an expedition, and dwelt more especially on the great benefits to the discipline and tone of the naval service to be obtained from such training as Arctic service afforded. In 1868, he read another paper on the same subject, and since then, on all occasions when an opportunity presented itself, he had advocated the sending forth of a new Expedition to the Arctic regions. It might be fairly said, that it was in a great measure owing to his efforts that the British public had been educated to understand and appreciate the scientific, professional, and national advantages to be derived from such an undertaking. The gentleman who was entitled to be called their second champion in this matter was Dr. Hooker, the President of the Royal Society. In 1865, Dr. Hooker drew up a memorandum on behalf of the Linnean Society, in which the important biological results of Arctic exploration were pointed out with great cogency, and he had since further assisted in collecting the scientific materials which had fortified the applications made to Government. Finally, last July, he joined with Admiral Sherard Osborn and himself (the President) in waiting upon the First Lord of the Treasury, when they laid their scheme before him, and obtained his commendation and good opinion. Dr. Hooker's assistance had been throughout most zealous, most earnest, most steady, and most efficacious. But, perhaps, no persuasion or argument would have sufficed to induce Her Majesty's Government to undertake such a responsibility as that of sending a large body of officers and men to the North Pole, had not Commander Markham, in 1873, proceeded to Baffin's Bay in a steam-whaler, the *Arctic*, with a view of testing, by actual personal experience, the power of steam in overcoming the difficulties of ice-navigation. That cruise was perfectly successful. Commander Markham passed easily in his steamer from point to point, where former Expeditions had been baffled and arrested; and it was mainly owing to the graphic account which he gave of his voyage, on his return, that the public mind was disabused of the idea of great danger in navigating a Polar sea. He took this opportunity of recording, on the part of the Royal Geographical Society, and, he believed, of all scientific men, their high appreciation of the enlightened views of the First Lord of the Treasury, who, immediately he was put in possession of the true state of the case, took upon himself the responsibility of committing the Government to the Expedition. The executive details were entrusted to the Admiralty, who appointed a Committee composed of the very pick of the Service, the *élite* of the Arctic naval officers, to organise the Expedition. The names of Admiral M'Clintock, Admiral Richards, and Admiral Sherard Osborn, were a sufficient guarantee that all the arrangements had been and would be conducted with thorough efficiency. Two vessels, the *Discovery* and the *Alert*, had been obtained by the Government, and were being strengthened and prepared at Portsmouth. An excellent body of officers had been selected, especial regard being had to their qualifications: Captain Stephenson and Commander Markham had been appointed to the two vessels, while the supreme command, greatly to the benefit of science and of the nation, had been given to Captain Nares, an officer who had had much personal experience in the Arctic seas, having served 20 years ago with Admiral Kellett, and travelled 1500 miles in sledges. To these qualifications he added great experience in surveys, and had obtained a world-wide celebrity as having had charge of the exploring ship, the *Challenger*. Soon after the Expedition was decided on, Mr. Clements Markham proposed that the Society should publish a manual, giving all the available information with regard to the Arctic regions for the instruction of the officers of the Expedition. After some discussion, it was arranged that the Royal Geographical Society should confine itself to issuing a manual of Arctic geography and ethnology; the other departments of science being left to the Royal Society. Those manuals were now in active preparation. The officers appointed were fully competent to undertake all the ordinary work of the Expedition, such as the astronomical, the magnetic, the tidal observations; and a zoologist and a botanist had been chosen from the outside. It was to be hoped that a geologist also would accompany them, with a view of determining some very important questions referring to what is called the warm period of the Arctic zone. A letter had recently been published in 'Nature,' which repeated some observations made before this Society by Dr. Hooker, and drew attention to the fact, that, just before the advent of the cold period, a magnificent flora, which would require at least as much light and warmth as England now enjoyed, flourished in luxuriance as far north as the 78th parallel. That was a point of the greatest importance to science, and was very well worthy of being investigated by the officers employed in the Expedition.

The following Paper was read:—

On the Route towards the Pole, for the Arctic Expedition of 1875.

By Admiral G. H. RICHARDS, C.B., F.R.S.

IT appears to me that the first duty I am called upon to discharge this evening is to apologise to you for being here at all, and briefly to explain why it is that I am here.

The fact is, our President thought it would not be unfitting, in view of the forthcoming Polar Expedition, that some familiar sketch of the route by which it is intended to proceed, and some general outline of the plan of operations to be pursued, so far as it is decided on, should be placed before the Society—the Lords of the Admiralty having been good enough to give their consent—and, moreover, that it would be agreeable to the Fellows to meet Captain Nares and his future companions, most of whom are here present.

This pleasing task was undertaken by my friend Admiral Osborn, who would have done full justice to it, but, owing to unfortunate circumstances, he has been prevented from carrying it out, and even from being present here to-night. My friend, Captain Nares, with that modesty which is the peculiar characteristic of seamen as a race, and I hope I may be forgiven if I say especially of Arctic seamen, would prefer to appear before you as an actor on his return, and so the task has been delegated to me at somewhat short notice. I am aware that I am much out of my element, and that, among the few remaining Polar relics of a past generation, I am about the least qualified to perform it.

This Society, as you are all aware, has persisted through long and weary years, and under much discouragement, in urging the revival of Arctic discovery, and perhaps to no individual are we more indebted—I should rather say so much indebted—for success at last as our able and unwearying Secretary, Mr. Clements Markham.

Arctic enterprise has always been to this country, and has had the same attractions for Englishmen, as those El Dorados of Mexico and the Indies held out to our Southern neighbours. If we may accept Milton as an authority, we were alike actuated by selfish motives, the pursuit of worldly gain: it is not necessary, however, to inquire too closely into motives; honour and ambition had, doubtless, their share, and certainly England may look back upon her Arctic traditions, ancient and more recent, with just pride and satisfaction.

The various able authorities who have hitherto dealt with Arctic questions, here and elsewhere, have felt it necessary to recur to the exploits of by-gone ages, and to dwell on the more recent deeds of those enterprising men of other countries who of late years have followed in our footsteps, and, to a certain extent, supplanted us in a sphere which Englishmen have been accustomed to consider as exclusively their own.

If I depart from this practice on the present occasion, the reasons for doing so, I think, will be obvious—the whole condition of things is changed. Geographers have, no doubt, been justified in using every legitimate argument to arouse in the public mind a sense of the duties and responsibilities of the country, and when I look back on all that has been written and spoken on this great question during even the past ten years, I feel almost amazed at the pertinacity and perseverance of that proverbially pertinacious race—the race of geographers. Nothing, indeed, has been left untried which their ingenuity could suggest or devise; the skill even of one of our most gifted artists has been invoked, no doubt at the instigation of a geographer, and, if public opinion is correct, that celebrated picture which lately appeared at the Royal Academy played no insignificant part in convincing the country that the uttermost end of the earth must, if possible, be reached, and that it is England's mission to reach it.

If, however, I forbear to call up the shades of those ancient *and illustrious worthies*—Hudson, Baffin, and a host of others—and if I dwell as briefly as possible on the discoveries of our own contemporaries, it is from no want of respect to either; and in addition to the reasons already given, it is to spare your patience and to avoid ground perhaps already too well trodden: to a certain extent I must, however, encroach on the field of modern research, in order to lead up to the subject I have undertaken to introduce to you this evening.

I have always thought that a good deal of misapprehension existed in the minds of many intelligent persons, and of the public generally, as to the position we have occupied in regard to Arctic Exploration during the last half of the present century. As a matter of fact, we have not sent out any exploring expeditions for the last thirty years; nor have we ever really made any serious attempt but once to reach the Pole, and that was Parry's attempt in 1827 by Spitzbergen. He was, no doubt, furnished with the best means and appliances which existed at the time; but if the physical difficulties he met with in that route had not intervened, the means of that day, when steam was unknown, were totally inadequate to the achievement of the object.

His previous series of brilliant voyages to the westward, as well as Franklin's expedition in 1845 in the same direction, were revivals of the old furor to accomplish the North-West Passage; and the subsequent expeditions were not sent for discovery, but for the rescue of Franklin.

Whatever the motives of our ancient explorers, it was well known in these latter days that such a passage, if found possible for a ship, could serve no practical purpose either for war or commerce, and the objects sought to be obtained were principally scientific knowledge and the encouragement of hardy enterprise among seamen, —both very worthy ones.

There can be little doubt but that, had Franklin returned moderately successful, his expedition would have been followed by similar ones in the direction of the Pole.

That indefatigable promoter of all enterprise, which gave the Navy an opportunity of gaining honour and renown, and especially of Arctic enterprise, and who had been mainly instrumental in sending forth all the expeditions of the present century up to Franklin's—I allude to the late Sir John Barrow, who for forty years was Secretary of the Admiralty—it is true was removed from the scene of his labours; but he had by his writings imbued the country with a thirst for discovery, and there were not wanting men of influence and authority ready to follow in his footsteps.

The unfortunate result, however, of Franklin's voyage, and in one sense the want of success of the many costly expeditions which followed each other in rapid succession for nearly ten years after his departure, wearied out the nation; and, however much it may be regretted, it can scarcely be wondered at that, so far as this country was concerned, Arctic enterprise slumbered for twenty years. During that period every argument which could be founded on the great catastrophe was naturally used by the opponents of further exploration, and with some apparent plausibility; yet, in reality, such arguments were neither fair nor logical. Some peril must always be incurred in a new enterprise, and experience in all such operations, great or small, must be gained at some sacrifice. The sacrifice in this case was large, because the experiment was a great one. Hundreds of lives are lost every year upon the ocean, but not a ship the less crosses the sea.

It is perfectly well understood now why the crews of the *Erebus* and *Terror* perished, and why for so many years their fate remained an absolute mystery; humanly speaking, neither event can be repeated.

When the ships passed north out of Wellington Channel during their first year and failed to get west, they retraced their steps southward in the hope of finding a navigable passage along the coast of America. They were unacquainted with a current which constantly sets from the Pole southward through the several channels, then but partially explored, and they became hopelessly jammed in a *cul de sac*, from which they were never able to extricate themselves; but if it had been possible, as it is now, to fix upon certain rendezvous for the crews to fall back upon at a certain date, there to have been met by a relief ship, there would have been no catastrophe, or even had the ships been furnished with the travelling provisions and sledge-equipment, which later experience has taught us are essential on such service, it is more than probable that many of those who perished would have escaped. It is easy now, however, to state all these ifs, and to be wise after the event; and I merely allude to the circumstances to show how much we have learned since that time, and how impossible it is that such a misadventure should again occur. I have said that the subsequent expeditions were in a certain sense unsuccessful, and so I think it right to express my opinion that no service was ever carried out more faithfully than the search for Franklin. The Commanders of these several expeditions had difficult and delicate tasks to perform, and each did his best according to his lights. There was no clue to follow; the very appearance of being influenced by any object but *the search had to be* avoided: no man dared to look north, for it would have been considered treason to the cause; none, it must be owned, was bold enough to go far south, but all did their best to go west, and, so far as our lights went, this was the right direction.

But for the discoveries of that distinguished Arctic traveller, Dr. Rae, on his memorable journey in 1854, the fate of Franklin and his companions might have remained a mystery still. How, guided by those discoveries, aided by his own instincts and great experience, M'Clintock and his gallant companions, Hobson and Allen Young, finally solved the mystery in the little *Fox*, fitted out by Lady Franklin, is too well known to require further comment here.

I have alluded to these circumstances, otherwise perhaps foreign to the present subject, in order to show the great knowledge and experience which has been gained by these expeditions, and which is sure to stand us in such good stead now. It is now time that I should deal with the future, and as little as possible with the past.

It has been decided, and I think wisely in the interests of science and the acquisition of knowledge generally, to say nothing of the credit which it will reflect on the country, to despatch a well-equipped expedition to reach the highest possible northern latitude, and the Pole itself, if it may be. The route by which such an attempt should be made all Arctic authorities are, I believe, unanimously agreed, is the channel leading north from the head of Baffin Bay, the southern entrance of which is known as Smith Sound.

One of the cardinal laws of Arctic navigation by ship is never to turn a corner, if it can be avoided. Every corner that is turned greatly reduces the probability of advance or the chance of successful retreat. One of the obvious advantages of this route, therefore, is that it offers almost a straight course from the entrance of Davis Strait to the 82° parallel of north latitude; how much further we know not yet, but it has been sailed up to that point, or within less than 500 miles of the Pole. There are other advantages which, if time admits, may be referred to hereafter.

The entrance of Smith Sound, as is generally known, was discovered and named by Baffin in 1616, when he sailed round the head of the bay, or, more correctly speaking, the sea which bears his name. There is no record of its having been revisited until two centuries afterwards, when John Ross and Parry passed its entrance and named the capes on either side after their ships *Isabella* and *Alexander*. Sir John Ross considered the head of the Sound to terminate at about the distance of 18 leagues from its entrance, though on what ground does not appear. The old navigators were apt to allow a little play to their imaginations in questions of this kind;

and it may be doubted whether Arctic explorers of a later generation are all free from a similar amiable weakness.

The first recorded entrance into the Sound is that by the present Admiral Inglefield in 1852, when, in command of the little steam-yacht *Isabel*, fitted out by Lady Franklin, he penetrated as far as about 78½° of north latitude, and named many points and headlands then in sight, which appear since to have given place to others by subsequent explorers—a practice which I cannot help thinking is to be regretted when those of the prior discoverers are recognisable.

But the time was now coming when Smith Sound was to undergo a more searching investigation, and to become the theatre of events as remarkable for their boldness and daring, and in some respects, it must be owned, for their dramatic adventure, not to say recklessness, as any which have been recorded in the annals of Arctic history, ancient or modern.

No people have shown a greater interest in Arctic discovery than the Americans. They spontaneously and cordially joined with us in the earlier search for Franklin; and when hope was abandoned by us in this direction, restless and enterprising spirits among them who had imbibed the love of adventure in the same service, persevered for years, and—with sometimes absurdly insufficient means, always under great disadvantages—accomplished results which must be admitted by all never to have been surpassed.

It would be impossible in a paper of this kind, and it is indeed unnecessary, to follow in any detail the adventures and discoveries of Kane, and Hayes, and Hall, and their several associates. The elaborate published accounts of those explorers are, no doubt, familiar to most geographers, and it is only necessary to my purpose in the briefest manner to notice the main incidents of their several attempts to open up this route to the Pole.

Dr. Kane, in a little sailing brig—the *Advance*—the same in which he had served under De Haven in the former American Searching Expedition, entered the Sound in 1853, and wintered in a bay he named Rensalaer Harbour, on its eastern side, in the latitude of 78° 37′; discovering by his travelling parties on that side points as high as about 81° of latitude, and on the opposite shore, about the position of the point now known as Cape Frazer, it was then, and in about these positions, that his people discovered what he and they considered to be an open Polar sea, and named it Kennedy Channel. Kane's wintering-place will, no doubt, be found correctly placed, but the points beyond it reached by his parties, and by subsequent explorers, can scarcely be expected to be fixed with *the same precision.* Next in succession to Kane in the exploration of Smith Sound, was his former lieutenant in the voyage just alluded to, Dr. Hayes, who in 1860–61 wintered in Port Foulke, and again took up his discoveries on the western shore of the Sound, when he reached as far north as about the latitude of 81½°, on the meridian, as he tells us, of about 70° 30′ w.

Finally, we have to record the discoveries of that remarkable explorer, Hall, whose name and deeds are familiar to all Arctic geographers of whatever nation. According to the narrative of the voyage and the accounts of his companions—for Hall never returned to tell his own tale—they reached the latitude of 82·25° N., when opinions were divided as to the feasibility or propriety of further advance, and they fell back on winter-quarters.

There can be no doubt that the position of these winter-quarters is in about the latitude of 81½° or 81·37°; for there were all the means on board the *Polaris* of accurately determining the latitude at least. Such briefly is the history of Smith Sound, and the channels beyond it. As regards longitude, and the accurate delineation of its shores, it matters little; all we are concerned to know is that it has been found a navigable channel for ships. It would be strange if future navigators did not find much to amend here and elsewhere in these regions; but they will bear in mind the circumstances under which it was explored, and will, doubtless, criticise in a friendly spirit.

Most Englishmen will be of opinion, I think, that—disastrous and unfortunate as were many of the incidents connected with it—the exploration of this great portal to the Polar area must always be regarded as a monument to the enterprise and perseverance of American explorers.

This, then, is the route which it is proposed our Expedition should follow; and I would now briefly advert to the character of that Expedition, and foreshadow, as far as one may, the objects which it is hoped may be achieved.

The two ships, which are to leave England during the spring or early summer of this year, are H.M.S. *Alert* and a purchased whaler renamed the *Discovery*. They are both fine vessels, of over 700 tons burthen, furnished with steam-power, and are now being fitted out at Portsmouth under the superintendence of Sir Leopold M'Clintock. They are being made as strong as wood and iron can make them, and will, doubtless, be equipped—I may say it without boasting—as only this country has ever equipped such expeditions.

The crew of each ship will consist of about sixty officers and men, and they will carry provisions, stores, coal, &c., for a period *of at least* three years. These numbers may appear small to those uninitiated in such service; but ships of a certain size can only be safely employed in ice-navigation, and the necessity of carrying provisions, &c., for so extended a period renders it absolutely necessary to reduce the mouths to a minimum. The crews, with the exception of three icemen to each vessel, will be composed of regular men-of-war's men, who have never failed in such work on their own element, or in dragging heavily-laden sledges over the frozen sea or land, as the case may be. As one of the objects of the voyage is scientific research, former precedent is so far departed from that a skilled naturalist is to be squeezed into each ship, and on this account two naval officers the less can be carried.

Instruments and appliances for the investigation of all branches of science will be provided, so far as stowage can be found for them.

I should not omit to mention that arrangements have been made for the supply of about 60 dogs on the ship's arrival in Greenland, to assist in dragging the sledges: perhaps I might more correctly describe them as wolves. I believe that several tons of the choicest dog-biscuits are being prepared for them, such as our favoured hounds are regaled upon. I have some doubts as to their being appreciated. My own experience of these amiable creatures is, that they prefer eating one another. They may have improved, however. Sir Leopold M'Clintock thinks highly of them.

Finally, as you know, the expedition is to be commanded by my gallant friend here on the platform, Captain Nares, who has already gained his spurs on Arctic and other distinguished service. I do not think I need go into any further detail as regards the ships or their equipment, my advice to the Society would be to go to Portsmouth and judge for themselves about the middle of May; they may be sure of a cordial welcome.

In the ordinary course of things, the two ships would probably leave England about the end of May or early in June, and take the usual route by Davis Strait and Baffin Bay; where, instead of turning the corner of Lancaster Sound and Barrow Strait, they would endeavour to pass up Smith Sound and the channels beyond it discovered by American navigators.

Here, probably in about the 81° or 82° parallel, if such a position can be reached, one ship will be left; and if so, she will find plenty to occupy her travelling parties in the spring and summer of 1876 in the exploration of the north coast of Greenland, or land adjacent, or in any other work the leader of the expedition may cut out for her; and here she would await his return or further *instructions from him*

Captain Nares, on leaving his consort, would, no doubt, endeavour to push north with his own ship. Beyond this it scarcely becomes me to predict. We may be certain, however, of two things: one is that the two commanders, if they should winter apart, will use their best exertions to communicate with each other in the spring of the year 1876, which there is no reason to doubt they will be able to do by travelling-parties, aided, perhaps, by those noble animals before alluded to; and the other is, that one ship will be in a position for the crew of her consort to fall back upon, should such a step become necessary.

Again, the exploration to the north would be limited by the Pole not 500 miles from the assumed position of the vessel of the second in command, and the exploration by ship east and west would be circumscribed; when it is added that part of the design is that a ship shall visit Smith Sound in 1877, should the expedition not have previously returned, it will, I think, be admitted that all which human foresight can devise will have been done to insure success and to secure safe retreat. Although, however, we may not forecast, we may be permitted to speculate on the nature of the land or sea which lies beyond the 82° parallel, though, perhaps, we shall be treading on delicate ground.

We know that, from the Polar area included between the meridian of Spitzbergen on the east and Melville Island on the west, a constant current or drift sets to the southward, through Smith Sound, through Wellington Channel and the channels west of it, through Peel Sound, and Prince Regent's Inlet; that it sweeps with great violence through Hecla and Fury Straits, and also through Hudson Strait and down the coast of Labrador. This is the current which forced the ice on King William's Land and prevented the release of the *Erebus* and *Terror*, which carried the abandoned *Resolute* out of Barrow Strait into the Atlantic, and which, in the month of July or August, annually clears the ice out of Smith Sound, unless some local conditions should combine in an unfavourable season to prevent it. The inference I draw from these and other circumstances is, that there is no continent or great mass of land in the Polar area north of Greenland or the Parry Islands; and it is somewhat strengthened, though perhaps not materially, by the fact that Sir Edward Belcher in his voyage saw no land to the north from a considerable elevation on North Cornwall, neither did his travelling parties in their journeys westward in about the same latitude.

At any rate, on the existence or absence of continuous land to *the north of* Smith Sound, or of an archipelago such as the Parry group, must depend the operations of a ship after leaving this position. If navigable water, or partially navigable water, is found, it is possible that short work may be made of reaching the Pole: if continuous land is found, along the shores of which sledges can travel, a very high latitude, or probably the Pole, may be reached in this way; but if continuous land, or nearly continuous land, is not met with, all Arctic travellers know that the distance to be accomplished by sledges and boats combined is a very limited one. I should not wish to be misunderstood in this remark. Travelling by boats alone during the autumn, when there are occasional leads of water and before the young ice has begun to make in September, is not difficult, nor so dangerous as ship navigation.

This appears to me to be the place to offer a remark on those polynias, or open Polar seas, of which so much has been written or spoken. A man standing on the deck of his ship sees open water all round him, that is to say, he sees the horizon about 5 miles distant in every direction. If he goes to his mast-head, supposing it to be a respectable height, he may see 15 miles; and if he ascends a high hill, he will see a greater distance if atmospheric conditions permit. All who have navigated among ice will remember the feeling of pleasure and relief when the report from the mast-head is, "No ice in sight!" and the corresponding depression which takes place when, having run a dozen miles from the same place, is heard "No water in sight!" The only proof we can be expected to accept of an open Polar Sea is that it has been sailed through.

And now that we have succeeded in getting this Expedition, it seems scarcely fair that we should cease to affirm our confidence that good will come out of it. I do not mean to say that the Chancellor of the Exchequer will find the Treasury coffers sensibly replenished immediately on the sailing, or even on the return of the Expedition. It is also possible that no immediate benefit will accrue in a commercial point of view; but I remember some twenty years ago there was not a steam-whaler in the Arctic seas. I have always thought that the employment of our little steam tenders in the last two expeditions had something to do with the general introduction of steam-whalers. I believe, since this change took place, very few of these vessels have been destroyed by the ice; but in the days of sailing whalers scarcely a season passed without several of them being nipped, and I fancy the people of Dundee and Peterhead have gained somewhat by the change. If this Expedition should find a whaling-ground north of Smith Sound, we may be sure the whalers will not be long behind them. But this is taking *a low view of the question*: it is quite certain that no great and noble enterprise of this kind can ever be sent forth without resulting not only in material advantage, but without adding greatly to the sum of human knowledge, and so advancing the cause of truth. I heard a lecture a few nights since at the Royal Institution: no doubt many here present heard it also. We were told there, on the highest authority, of the wonderful progress which had lately been made in the knowledge of physical science, owing, in great measure, to expeditions of this kind. We heard with astonishment—at least, I did—what had been the results gained by the few naval deep-sea exploring vessels sent out by the Admiralty within the last ten years; how that views, which until recently had been scarcely more than the conceptions of some great minds, and which, for want of evidence, it had been scarcely safe to enunciate, had, some of them, been placed beyond doubt, and others rendered so certain as scarcely to require further corroboration.

Is it, then, so small a thing in these days, when we hear so much of education on every side, and the country is paying so handsomely for it annually, that, at the expense of a few thousands, or even more, we should learn the age, and history, and constitution of the world we inhabit?

We never hear now of the science of astronomy being discouraged, though men did get into some trouble for suggesting the truth formerly. Every encouragement is now held out to astronomers to study and reveal the mysteries of worlds millions of miles from us; and, within the last half-dozen years, untold sums have been expended by this and all other civilized countries in finding out whether the sun has an atmosphere, and ascertaining within 100,000 miles how far he is distant from us. These awful mysteries do not at all disturb our equanimity, and very properly we are willing to pay for prying into them; but whether it is that we are unselfish enough to remain in ignorance of our own concerns on economical grounds, or whether we prefer not to disturb comfortable old theories which date our existence a few thousand years back only, it is all the same, there is no retreat now: we shall never arrest the progress of human knowledge. I should like, however, before I close the subject, to say one word to scientific men. They expect very much from this Expedition, and, doubtless, they will get very much; but they must not expect too much. Some there are who know exactly what to expect, for they have taken part in such and somewhat similar service; others there are not less eminent, but more sanguine. I would ask them to bear in mind that on Arctic service there is little leisure for real scientific work until winter quarters are reached, and that with a temperature varying from 30° to 80° below the freezing-point, the swinging of the needle or the recording the vibrations of the pendulum lose some of their attractions; that the ardour of the most enthusiastic of observers and collectors is somewhat damped, and that, above all, the sea, whose secrets are, perhaps, most anxiously longed for, is a sealed book for nearly eleven months out of the twelve, and that its bottom must be reached by boring some 10 or 12, or more, feet through its icy covering. Notwithstanding all this, it may be regarded as certain that the officer who for the last two years has successfully commanded the Naval Scientific Expedition, *par excellence*, of this or any country, is not likely to let slip any opportunity which may offer in the interests of science.

A very few words more. Some of those who have been the strongest advocates of Arctic discovery have, perhaps unconsciously, been led to underrate or make light of the task which lies before the Leader of this Expedition. I may have been among the number myself; but it is very certain that, under the most favourable conditions, skill and perseverance in no ordinary degree, and the united efforts of all, will be necessary to ensure success, even moderate success; and it is equally certain that conditions have been met with, and may be met with again, which will baffle all human skill, and defy all human effort. Nothing is so uncertain as ice-navigation: the best-laid schemes may be frustrated, and a whole season lost, by the accident, for instance, of the wind hanging in a particular quarter for a couple of days during a critical time.

No human effort can force a ship any distance through a solid floe of ice, any more than she could be forced through the crust of the earth. If she cannot reach within such a distance of the Pole as will enable the journey to be accomplished by travelling-parties in a given number of days, then success, so far as reaching the Pole is concerned, will not be obtained; but I am very far from thinking that the success of the Expedition depends on reaching the Pole, or even a very high northern latitude.

If, however, perfect success is to be attained by skill and perseverance, I for one, knowing Captain Nares from his youth, am certain that it will be attained, and that he will not be found wanting in that equally necessary quality, viz., the moral courage which will tell him when he has done enough.

The Right Hon. G. WARD HUNT (First Lord of the Admiralty) said the Expedition had his best wishes for its success. No pains had been spared at the Admiralty to equip it in the best possible way, and to select as the leader and officers those in whom thorough confidence could be placed. He felt deeply indebted to those experienced Arctic voyagers who had consented to take upon themselves the arrangements, and was perfectly certain that everything would be done that could be done to render the Expedition worthy of this country. Admiral Richards had warned the Meeting not to expect too much, and that advice had been well given. If the results did not prove to be great, there would, at all events, be the satisfaction of having done their very best; but he felt confident that the results would, in a scientific point of view, be very valuable, and would greatly increase the knowledge of the physical nature of the globe. No doubt there were risks to be encountered, but they were not such as to deter Englishmen from pushing forward maritime discovery, or from going to whatever part of the world they were sent by their Queen and Government.

Admiral Collinson observed that it was greatly to be regretted that the Expedition would not have the advantage of the experience of the voyage of the *Erebus* and *Terror*. Unfortunately the journals of Franklin's Expedition had not been recovered. All that was known was that they reached 77° to the northward of Cornwallis Island; but this showed that the ice to the northward of Parry Archipelago was more in motion than it was further south. If the new Expedition came upon a firm impenetrable body of ice, such as existed between Melville Island and Banks Land, their progress would be entirely stopped. He was, however, pretty well assured that by following the land, and not turning a corner, they would get further north than had ever yet been attained. The most serious difficulty to contend with was not the ice nor the water, but the combination of the two. It was this which baffled Baron Wrangel off the Coast of Siberia, when, for four successive seasons, he was driven back by arriving at water which he could not take his sledges over. On the last occasion he started with 22 sledges and 240 dogs, and travelled over 1300 miles in 78 days. Captain Nares would not be able to muster that number of dogs, but if energy and perseverance could command success, he would undoubtedly succeed.

Admiral Sir Leopold M'Clintock said the success of Captain Nares's Expedition would depend mainly on his sledging. The ships, it was hoped, would reach 82°, where the Americans reached two years ago. They would then be within about 500 miles of the North Pole. If such ice was there met with as was commonly found in Lancaster Sound, the Expedition would, without doubt, reach as far as the Pole. The system he himself had adopted for sledging was to break up the ship's company into parties of seven or eight men, each with an officer. A tent and a sledge were provided, and six weeks' provisions could be drawn along at the rate of about 12 statute miles a day. That would enable them to travel something like 600 miles—300 miles out and 300 back; but if several sledges were put on the same track, and all but one gradually sent back, each before it returned filling up the advanced sledge, it was clear that one sledge could be pushed greatly beyond 300 miles. If the land proved to be continuous, depôts of provisions would be sent on in advance. The ground would then have to be travelled over as quickly as possible to the most northern depôt, where the sledges could be filled up, and a start made for the Pole. The object should be to make the equipment as light as possible, so that the provisions taken might be the more. In the first Expedition, under Sir James Ross, all he could manage to drag was 30 days' provisions; in the second Expedition he took 40 days'; in the third, by reducing the weights of the tents and sledges and paying the utmost attention to every detail, he was enabled to travel with 53 days' provisions. Besides the sledges to be drawn by the men, the new Expedition would have five or six sledges to be drawn by dogs. His own experience was that two dogs would drag as much as one man. They did not eat so much as a man, they required no clothes or cooking, and altogether it was much more economical to have dogs than men. On his last Expedition he had 24 dogs, and without them he should not have been able to do one-half of what he did accomplish. It was wrong to attempt to house them; they would live near the ship all the winter. If they were housed or treated differently from what they had been accustomed to, they would get sick and die. About 120 men would be sent out in the two ships, and with about 60 dogs he thought they would be able, by dividing themselves into about a dozen parties, to cover about 8000 or 10,000 miles of ground, and that would be doing a great deal. Temperature had very little to do with travelling. The moment there was sufficient light the travelling should commence. That would be about the end of February, and the thaw did not begin till the latter end of June. Of course when the ice began to dissolve they would have to discontinue their sledging.

Captain **VESEY HAMILTON** believed the Esquimaux dogs to be the most ungrateful creatures in creation. He on one occasion travelled several hundred miles with only one companion, and his duty for six weeks was to feed the dogs; but a week after he left them they would not recognise him in the least. During the winter they were supplied with food only once a week, the diet being their companions that had died, proving dog does eat dog. Dogs were most useful in keeping up communication between the depôt ship and the other parties, but for unknown ground he preferred men, as dogs cannot work unless well fed; nor can they do much in heavy, hummocky ice.

Admiral **OMMANNEY** said that Englishmen must be grateful to their American cousins, who had cleared the way by successive years of exploration in Smith Sound, and had shown that the parallel of 82° might be reached by our discovery ships in one season. From that point (Hall's farthest), as a base, sledge parties would no doubt be able to attain very important results. He was glad to hear that the equipment of the Expedition was in such good hands as those of Sir Leopold M'Clintock, who was his (Admiral Ommanney's) First Lieutenant when he discovered the first traces of Franklin and Prince of Wales Land. Ten years ago, when this question was first brought before the public, there was some diversity of opinion with regard to the best route to follow, and he himself preferred advancing north by way of Spitzbergen at that time. Since then, however, various attempts had been made in that direction, and the Austrian nation had come forward nobly, and discovered land to the north-east of Spitzbergen; therefore his predictions that land would be discovered in that direction have been realised, and, thanks to the noble and heroic conduct of Payer and his small band of followers, we have now and then stepping-stones from whence Polar Exploration can be prosecuted. He hoped to hear that Austria would send forth another expedition independent of Captain Nares', with the object of advancing to the Pole from Franz-Joseph's Land.

Admiral Ommanney exhibited also the portrait of an Esquimaux, whom he brought to England from Wolstenholme Sound, in 1851, and expressed his belief that the scientific gentlemen of the Expedition, amongst their pursuits, would find the ethnology and history of this interesting people in the vicinity of Smith Sound a matter for full investigation. These people were a limited number of human beings, probably diminishing in numbers, isolated and cut off by glaciers from the rest of the human race. They were first discovered by Sir John Ross in 1818, and the purity of the breed had continued, in all probability, since their migration from Asia.

Mr. **CLEMENTS R. MARKHAM** said he had been requested by Sir George Back, who is the Father of Arctic Voyagers, to express his disappointment at not being able to be present on this occasion to wish those young officers God speed who were about to enter upon the strife in which he, in past times, gained such imperishable laurels. The work of the Arctic Expedition will be *to explore as large an area as* possible of the unknown region, every part of which teems with interest in all branches of science. Captain Nares would doubtless make an attempt to reach the Pole, for it forms the centre of the unknown region; but the value of his effort would consist in what was observed during the march, not in anything to be seen at the Pole itself, which, after all, is a mere point without length, breadth, or thickness, and therefore with no special interest. The work will involve all the hardships and dangers encountered and overcome during previous expeditions, and it is difficult for those who have had no experience of it to realise how very severe that service is. But the men were here to-night who intend to do the work, and to equal, if not to surpass, what Ommanney, M'Clintock, and Osborn did in 1851, and M'Clintock, Mecham, Hamilton, and Nares in one direction, and Osborn and Richards in another, in 1853. Whether our Arctic explorers went north, or east, or west, so long as they were within the unknown region, and did as much as their predecessors, they would, Pole or no Pole, have achieved complete success.

Dr. Rae remarked that, in his first survey of Arctic America, in 1847, he explored a coast-line of something like 600 miles, joining together Sir John Ross and Sir Edward Parry's discoveries. His party procured their own food, and made their own clothes of the skins of the rein-deer which they killed. That journey was accomplished at the rate of from 17 to 18 miles a day. They started very slowly at first, but the advantage of his Indian sledges or tabogans was this, that as they were lightened the ends were cut off to be used as fuel, and when passing over deep or soft snow, they did not sink down as sledges with high runners do. On the west side of Melville Peninsula the ice was so packed on a rock-bound coast that everything had to be carried across it. That was the hardest work he ever did. The ice and rocks were so rough that sledging was utterly impossible. The men were taught to build Esquimaux snow-houses, so that tents were not needed. They could usually build such a house in three-quarters of an hour or an hour, and when once they got inside were perfectly comfortable. A single blanket sufficed for two men; for five men the bedding only weighed 25 lbs., whereas if tents were taken nearly every man would require that weight. His party lived for two years without any store of fuel, and very little provisions except what they themselves killed, but they were very jolly and comfortable.

Captain David Gray said he saw, in his whaling cruise of last year, an open sea north of Spitzbergen, in 80° north. He wished to know how those gentlemen who advocated the Smith Sound route accounted for the great rise and fall of the tide there, with southernly winds, and the open water said to have been seen by the *Polaris*. At the Duck Islands, on the south side of Melville Bay, the rise and fall of the tide was 5 ft. or 6 ft., while in Smith Sound, as shown by the height of the ice-foot as reported by Kane, it was about 18 ft. with southernly winds. The only way in which he could account for this was by supposing that Smith Sound was merely an inlet in which the water became banked up. No clear water could exist where it was said to be seen by the *Polaris* if there was any connection with the Polar Sea, because the tide would bring the ice down in a continuous stream. If, however, the tides met at Cape Fraser, then Smith Sound must communicate with the Polar Basin, and the ascertainment of this fact seemed to be one of the most important points connected with the question. He had navigated the east-coast route for the last 30 years, and could frequently have sailed to a very high northern latitude, without let or hindrance; and if the Expedition failed to reach a very high latitude by Smith Sound, he hoped they would go round and try the east coast.

Mr. Parker Snow hoped that the officers of the Expedition would not forget that the bleached bones of Sir John Franklin's party were still scattered upon the barren lands of the north, and that they would, if possible, make some effort to recover them and the precious documents relating to that voyage.

Mr. H. D. BELL, having stated that the Meeting would be glad to hear some remarks from the Commander of the Expedition,

Captain NARES said he had been frequently asked how he would use the compasses on reaching the North Pole. The answer simply was this, that the Magnetic Pole being situated at a considerable distance from the Pole of the Earth, there would be no difficulty to overcome in that respect. One of the chief causes of depression to those who wintered in the Arctic Seas, was the long continued darkness. During the summer the sun shone continuously on that portion of the earth north of the Arctic Circle, but in the winter it disappeared altogether below the horizon. At the Arctic Circle itself it merely just touched the horizon on the shortest day, giving three or four hours' twilight, but at the Pole there would be 182 days' darkness. The increase in the amount of darkness from the Arctic Circle to the Pole was very rapid. In latitude 75° there were 95 days of darkness, and on the shortest day the sun did not reach nearer than 8½° below the horizon; for about five minutes they could read 'The Times,' when it was held up facing south. Where the *Polaris* wintered in 82° they were 138 days without the sun, and for three months out of that time they were in perfect darkness. In latitude 85° there would be 153 days of darkness. There was one counterbalancing point, however, namely, that whenever the moon was above the horizon she was in her full during the Arctic winter, while when visible during the summer she was always in her first or second quarter. When Admiral M'Clintock spoke of having 53 days' provisions on his sledge, he meant 106 days, 53 days out and 53 days back, during the whole of which time he would have to depend entirely on his own resources, without assistance from anybody else in the world. If a party of men, dragging their own provisions, clothing, and tents, started from London, went up the east coast of England, then round Edinburgh, down the lakes of Cumberland, through Wales, and back to London again, without calling at a public-house or receiving assistance from anyone, he might have some notion of what Admiral M'Clintock had done. Captain David Gray had touched upon the two vital points with regard to Smith Sound. That Sound was either a *cul de sac* with the tide rushing up and increasing as it advanced, or the tides met at Cape Fraser, and the Expedition would then be able to go through.

The PRESIDENT, in concluding the discussion, said it was one of the great privileges of the Geographical Society to be able to introduce to the notice of the public matters of current interest, such as that which had been brought forward this evening. He wished, in the name of the Meeting, to express the great gratification they felt at His Royal Highness the Prince of Wales having been pleased to show, by his attendance on that occasion, the great interest he took in Arctic discovery. Such an event could not but be equally gratifying to the officers of the Expedition, who he trusted would, during the next three months, on many occasions renew their visit to the Society.

Seventh Meeting, 22*nd February*, 1875.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*G. M. Ogilvie, Esq.; Dr. Mason; Capt. D. Pender; J. G. Thompson, Esq.*

ELECTIONS.—*William Henry Bedbrook, Esq.; Capt. William Saurin Brooke (Bengal Staff Corps); George Chater, jun.*, Esq.; Benjamin

Slightly downhill all the way, with a steep dip just before reach
through which the river runs. Jungle road, but numerous s
villages. The plain seems pretty fairly cultivated. The Mutw
here, rather amused me. He came to pay me a visit, and I was
and had taken off my boots and stockings; I sat up on the be
room for him, and showed him guns, revolver, etc., and pictures
history book, when he suddenly caught hold of my toes, and began
them. He said he didn't think my feet were made for walking, th
white and soft; and after that, he transferred his attention to
which certainly couldn't be called white, as they are turned to the
a dirty dogskin glove; however, he came to the conclusion that I
chief, as I did not seem to have done much hard work. The mode of
here is very ceremonious. First, two chiefs meeting. The junior bends
and places the palms of his hands on the ground on each side of
whilst the senior claps his hands six or seven times. They then chang
and then the junior slaps himself, first under the left arm-pit with
hand, and then under the right arm-pit with the left hand. A chief and c
meeting do the same, except the second part. Two commoners meeting
bellies, then clap hands at each other, and finally shake hands. Th
this up to an unlimited extent, so that the sound of clapping hands i
going on. I hear that a village close to this has been harried to
Mirambo; they killed two men and two women, and carried off the
The villagers retreated here. They don't own any cattle in this vill
goats, and fowls, and eggs are plentiful, and I am feeding on t
The people all want to know what medicine I give the goat, to m
so fond of me. We go on and cross the river the first thing to-
morning. I hope there will be no difficulty. I find all the peopl
friendly, but bitter against the Arabs. I chaff them, and laugh at
when I find a large crowd staring; and they laugh also, and seem to
the fun. They like to have a look, but are not obtrusive, and will go
at once if asked to do so; they are a great deal better behaved th
people would be in an English village, if a black man came travelling
in the same way there.

Scarcely any cloth, most of the people wearing skins. Sambo and
bells common. The hair worn and shaved in all fashions.

Height above the sea, 3284 feet. The River Malagarazi is rather
one boat, besides which we want the canoes for the donkeys. I make b
point 1400 feet higher than Burton says; but there must be some fall t
the Lake. I would give anything for a lunar, but of course the morn
too cloudy. Some of the patterns of tattooing here are wonderfully comp
and pretty; the mother of the Mutwali especially is decorated most
sively. No colouring matter is used, but the patterns are formed of
cuts, like cupping cuts.

Palaver all the afternoon about crossing. An alarm that Miramb
coming in the evening; he had been near all day. Our informant was
who had been out in the fields near the village where he lived, an
told by some people who came running away that Mirambo had sac
A lot of other fugitives came in. Palaver not finished about Mhon
we were interrupted by this alarm. At first, the yarn was that h
coming here. His big brother and one of his sons were killed here fou
ago, and since then he has left this part alone till now.

Soon after sunset it came on windy and cloudy, and I could get
though I sat up till 4 A.M.

9th.—Palaver again first thing. When one has settled one deman
bring forward another.

Went down to see the river, about half an hour off, at the ferry :

1. *Discoveries in Eastern New Guinea, by Captain Moresby and the Officers of H.M.S. Basilisk.* By Captain J. MORESBY, R.N.

IN November, 1873, a Paper of mine, giving a brief outline of H.M.S. *Basilisk's* work in New Guinea, was read before you by your esteemed Secretary, Mr. Markham. Since then I was sent in command of an expedition to substantiate and follow up that work; and this Paper will give you, I trust, a summary of the results accumulated during these two cruises.

I confess I am amazed to think that the very outline of the third largest island in the world should have been unknown till now, and the navigation between its north-east coast and Australia invested with such imaginary dangers as to prevent communication between these shores.

I will now first endeavour to show you what I have accomplished, in conjunction with my able assistants, Lieutenant L. Dawson, Admiralty Surveyor, Lieutenant Sydney Smith, Navigating-Lieutenant Mourilyan, and the other officers of the ship; and secondly, give you the information we have been able to gather concerning the natives.

In brief, then, we have proved that East New Guinea ends not in a wedge, as hitherto imagined, but in a huge fork, the lower prong of which is cut up into an archipelago of islands. Between these new islands and the peninsula which forms the northern prong a sheet of water lies, about 45 miles deep and 12 to 18 in breadth, named by me Sir Alexander Milne Bay.

This new archipelago consists of about sixty islands, large and small. Of these the largest, Moresby Island, is about 36 miles in circumference; Basilisk Island nearly as large; Hayter and Heath islands somewhat smaller; many of the remainder being from 4 to 12 miles in circumference, and inhabited. These islands are mostly lofty and volcanic, and richly wooded.

Moresby Island, a fair type of the rest, rises boldly from the sea to a height of 1600 feet, rich in fruit-bearing and timber-trees, whose dark tropic green is relieved by the various earth-tints of the cultivated and terraced land, and the lighter greens of yam and taro. Here and there the eye rests on great grassy slopes that look like English meadows ready for the scythe; but a giant scythe, indeed, would be needed to cut them, for this grass is 12 feet high. We found it very difficult to make our way through to reach a good look-out from above, and the only plan that succeeded was for the leading man of the party to throw himself bodily forward and press the grass *down with his dead weight.* We relieved each other frequently at this duty, but still found it exhausting and most unpleasant, as we bled all over from the sharp grass. On the shore are scattered the most singular dome-shaped grassy hillocks, which made for us natural surveying stations. At the water-line the shore is broken into fine deep-water bays, some five of which are good harbours. Villages cluster to the edge of the calm waters, and here and there a coral-reef runs out, from which the dusky fishers ply their task.

I would I had the power to tell you of the glorious panorama which greeted us from the top of Glenton Island, the summit of which we had cleared with immense labour from its giant forest-trees, that the tiny theodolite might sweep an horizon never before gazed on by our race. Six hundred feet below us, almost as the plumb drops, the light waves curled on a snowy coral-beach. To the west the wooded peaks of Moresby Island closed the view; but on every other side island after island floated on the bosom of an intense blue sea, some volcanic, lofty, and rugged, others coralline, low, white, and covered with graceful trees, with every variety of form and tint, of light and shadow, in the nearest ones, whilst those beyond faded out as they distanced into dim shapes, faint clouds—very dreams of islands—giving one a sense of the profusion of creative power that was almost overwhelming.

The *Basilisk* has had the honour of fixing the position and laying down the coast-line of the D'Entrecasteaux group. These islands were seen from a distance by D'Entrecasteaux 94 years ago, as he sailed in search of La Perouse; but he never visited them, and he saw them on the east side only.

We have proved them to consist principally of three large islands, separated by narrow straits from each other and the mainland of New Guinea; and as their first surveyor and visitor, I have taken leave to name the islands Normanby, Fergusson, and Goodenough; and called the straits Ward Hunt, Goschen, Dawson, and Moresby. These islands extend north and south about 90 miles, and afford harbours and anchorages.

With your permission, I will give you a slight account of this survey. Lieutenant Mourilyan and I, with an engineer and seven men, started on March 7th in our steam-pinnace, with a whale-boat in tow, loaded with fuel and provisions for a week. We left the ship in Dawson Straits, and steaming to the westward we passed close under the high volcanic mountains of Fergusson Island which bound the strait to the north. The shore that we coasted was dotted with villages high on the hills, peeping through the sombre tropical green. We could see that our appearance caused great excitement amongst the natives, who must have thought us gods moving rapidly on the water without exerting an effort. They raced for miles along the beach inviting us to land (but we could not accept their invitation), shouting their cry of surprise, "Hōō-ee! hōō-ee!" Turning the western point of Fergusson Island, we found ourselves at the entrance of a fine strait separating Fergusson from Goodenough Island. Both these islands, with their forests topped by bare grey peaks, are grandly picturesque objects, Mount Goodenough rising magnificently to a height of nearly 8000 feet. The sides of this great mountain are cultivated in patches to a height of about 2000 feet; gradually its woods give place to barrenness, and its summits stand bare and knife-edged against the sky. Mountain torrents dash down its ravines and flash out at times from their dark-green setting, like molten silver.

Night now closing, we sought to anchor between a small islet and the shore; our draught of water was but 12 or 14 inches, and yet we could obtain no anchorage; the channel was full of mushroom-coral, which rose like great pillars from a depth of 20 to 30 fathoms to within 3 or 4 inches of the surface, so close together that after many a weary trial, off the entrance of lovely coves and delicious-looking bays, we had to seek a precarious anchorage in 20 fathoms' water outside these coral pillars, on which a dangerous surf was breaking.

The natives then crowded alongside us: but we were weary and wanted to have our evening meal in peace, to obtain which we blew the steam-whistle, and their consternation was absurd in the extreme; they seized their paddles and glided off into the darkness. All night long the near village clamoured like a frightened rookery, and our look-out men were frequently startled during the night by natives stealing out on the reef to within a few feet of us. At last some sleep being needful, I caused a rifle to be fired to seaward, and this secured us some quiet. Next day we failed for want of fuel to completely circumnavigate Goodenough Island. We landed on it and found it the home of the megapode and a variety of exquisitely-plumaged birds, unknown to us; also of parrots and lories.

Passing back to Fergusson Island, we landed at a large village in Moresby Straits. Strangely enough, for we saw no such thing elsewhere, the men hid themselves, and an old lady, with a very pleasant face, paddled off to us in a catamaran; we gave her strips of red cloth, and she became quite friendly. When we landed the married women alone advanced to us, the men appearing, but keeping back in evident timidity; but the presents distributed amongst the women soon brought the men about us, all anxious to exchange their stone-axes for our rusty iron-hoop. So entire was my confidence in the peaceable disposition of these people that, accompanied only by a seaman, I visited their inland plantations, and found large enclosures well fenced in with bamboo, producing tropical fruits, yams, sweet potatoes, Indian corn and sugar-cane. The sago-palm grows most abundantly here; and the natives mash the sago in immense troughs, which I at first took to be worn-out canoes. We all enjoyed this food, and used it largely.

The good feeling of these natives deserves particular mention; they had never seen the *Basilisk*, and knew nothing of our possessing superior arms. We were only ten men amongst hundreds, and they knew that we carried iron-hoop on our person, a thing of priceless value in their eyes; but not only did they respect our position, but they helped us over obstacles, showing us the best paths, and took care of our clothes when we bathed in their cool streams. Here, a mile from the beach, I saw large masses of coral-rock cropping up at perhaps a hundred feet above the sea-level in close vicinity to volcanic cliffs. There was a singular absence of coral-formation on the north side of Fergusson Island; and the beach and bottom of the sea, formed of black volcanic sand sloping gradually into deep water, offered many valuable anchorages. No natives lived on this part of the island, and we could not find any fish in the bays, but a wallaby was shot near the beach. We discovered here a number of boiling mineral-springs, strongly alkaline; they united themselves in one large rivulet, which offered any degree of temperature to our bathers. Other hot springs may exist here at the bottom of the sea, which would account for the absence of fish in the bays. In the sand and mud thrown out by these springs we found very small specimens of rubies and amethysts, evidently chippings from larger stones.

Our return to the ship was very arduous work; we had heavy weather and were out of coals, but by burning wood and greased coal-bags we succeeded in getting back.

Now, with regard to the great Louisiade reefs, I must say a few words. Our work here has proved that these reefs, hitherto deemed an impenetrable barrier between Australia and North-East New Guinea, present, in reality, a wide open gateway, through which ships may safely pass from Australia to North-East New Guinea, and enter on a shorter course to China. Previous to this discovery three routes lay open between Australia and China. Of these the shortest, or New Ireland passage, ran inside the Solomon Islands, and leaving the Louisiade Archipelago to the west, went between New Britain and New Ireland, and so on to China. Our new route lies to the west, instead of the east of the Louisiade reefs, and *shortens the* distance by about 300 miles, without, to my knowledge, increasing the danger. Eventually the trade with China will be carried on by steamers, and this, the shortest route, will doubtless be *the* route. Near Teste Island the Louisiade reefs sink from the surface to a depth of 10 or 12 fathoms, and so continue for more than 100 miles to the west.

To the immediate west of Teste Island ships bound by this new route pass over this sunken barrier; and here Nature has placed such striking land-marks that a land-fall can be unmistakably made. Teste Island is easily recognisable. Its peaks rise to a height of 300 feet, and look like islands at a distance. Four miles to its west stands Bell Rock, a great dome-shaped mass of rock, rising perpendicularly from the sea to a height of 500 feet, wooded over wherever a crevice affords room for a tree to grow, and marking well the entrance to the new route: it may be passed by a vessel within a stone's throw. Thence, as the ship passes between Moresby Island and Engineer's Group, not a reef lies in the way. To the north-west of Slade Island the passage lies between two reefs about 2 miles apart, and a passage of 4 miles' breadth leads to the point of exit between Cape Ventenat and a reef which I have named Gallows Reef. The channel here is 2 miles wide; and Gallows Reef being a wash, and marked by two tree-covered islets, affords sailing-marks which remove all danger to the navigator.

Another useful gift which the *Basilisk* has been able to present to the mariner and the merchant has been the discovery of harbours on these once inhospitable coasts. I cannot trouble you with a description of these many new harbours, but will speak of a few.

1. Robert Hall Sound, South New Guinea, in lat. 9° N., long. 146·3° E., is well marked by Yule Island at its entrance. I have a great belief in the future of this noble sheet of water, seen from seaward by Captain Owen Stanley's survey, but never entered till now, by a passage we have found off the south-east end of Yule Island. A good, safe, clear channel leads in, and the harbour is perfectly protected, and land-locked with deep water, for hundreds of ships to lie safely. Its shores are low, swampy, and mangrove-covered, and probably unhealthy; but Yule Island, near which ships would anchor, is high and healthy ground. At the head of the harbour Hilda River issues, navigable for steam-launches, but too rapid for row-boats to ascend, destined in time to bear the valuable woods and many produces which here await the advent of commerce downwards on its rapid bosom.

2. Port Moresby is a safe, commodious, double haven, lying 60 miles to the east of Robert Hall Sound, at the point where *the swampy coast first* gives place to coral white sand and shells.

Truly this harbour was "the desire of our eyes;" and when, after much search in open boats, we discovered this harbour from Jane Island, we were very joyful. Then the great anxiety arose as to whether we could find a good entrance; and for two days more we sounded in our little galley and cutter, far away from the ship, inside the great barrier-reef, to find an entrance. Suddenly I dropped my lead 50 fathoms down, and finding no bottom, knew that the entrance was found. Two days after we took the ship in. The outer harbour of Port Moresby is an extensive bay, surrounded by open, grassy, round-topped hills, thinly timbered with the Australian gum-tree, whilst rich tropical valleys lie between. There are several large native villages on its shores. Jane Islet, about 500 feet high, lofty and precipitous, wooded and cultivated, stands in the centre of the outer harbour, and if fortified would render it impregnable. The eastern waters are a mass of coral-reefs; but the western are clear, and just the right depth—9 to 12 fathoms—for anchoring. A fine, clear passage leads to the inner, Fairfax Harbour; and in this inner broad sheet of water, shut round by high land, the *Basilisk* anchored in 5 fathoms. On its southern side from the hill under which she lay, a considerable quantity of gold-quartz was taken, specimens of which are here for your inspection. We were too busy surveying to prosecute this discovery; but, as I have before stated, the aspect of the land, and character of the masses of granite-quartz cropping up, lead me to think that gold will be surely found here. This port, from its healthy situation, has already been selected as the principal station of the London Missionary Society.

Pitt Bay is a fine harbour, and easily entered; it lies at the gateway of the New Austro-Chinese route at the east end of Moresby Island, embosomed by lofty hills. Hereafter the power holding Pitt Bay will possess the key of the route. At Pitt Bay we took one piece of gold-bearing quartz from the bed of a stream, but though we searched diligently, we could not find a second.

Traitors' Bay, on the north coast of North-East New Guinea, in lat. 8°, and long. 148° E., offers shelter to ships trading on that coast, and possesses a navigable river with a gentle current. This river discharges itself outside the anchorage, over a bar that proved impracticable to our boats. I regret much that I had not time to survey this river, for it seemed to me to lead up far into the country, and I hope some future explorer will follow it up. It needs no words of mine to show you how important it is that this great country should be opened up by water-communication.

Running Survey of the North-East Coast.—Our last work was the running survey of the unknown coast of North-East New Guinea.

On April 27th, we joyfully turned the *Basilisk's* head westward, for every mile was now a step towards home.

The first striking difference between these northern and the southern shores of New Guinea is that here there is no outlying barrier-reef, and the shores, instead of shelving outwards, are steep to. The mountains here generally run down to the sea, then follows a shore-reef, from which the plumb-line may be thrown into 50 fathoms of water.

The coast-line is but little broken up, and affords few harbours and anchorages. Speaking generally, from East Cape to Cape Cretin the coast-line may be spoken of as a series of bold headlands, running out 20 or 30 miles to seaward, with deep bays between; this configuration increased our work threefold.

The great Owen Stanley Range may be said to terminate at the head of Sir Alexander Milne Bay, but one of its spurs, named by me "Stirling Range," runs at a diminished elevation through the narrow peninsula which terminates at East Cape. This henceforth important promontory on the world's map has no great feature to attract attention. The peninsula has gradually narrowed to half a mile in width. The Stirling Range has ceased, and been succeeded by a low, undulating forest-country, sprinkled with villages, when suddenly an abrupt double-topped hill springs to a height of 300 feet. There is a village at its foot, half-hidden in groves of bread-fruit and coco-nut trees. Its summits were crowned with tropical forest when first we saw them; but these noble trees fell to our axes, as we made this a theodolite station. A narrow boat-channel separates the cape from two low coral islets, and 10 miles further to the eastward, on the opposite shores of Goschen Straits, rises the dark, frowning mass of Mount Prevost, on Normandy Island.

This, then, is the East Cape, and real eastern terminating point of New Guinea. From East Cape to Cape Moresby, as the crow flies, the distance is about 130 miles, with a depth of 500 to 600 fathoms, and muddy bottom at about 2 miles from the shore. Villages abound here; and the valleys between the hills, and not seen from the sea, are richly cultivated.

Between Cape Ducie and Cape Frere the forest ceases, and is succeeded by an openly wooded level plateau full of villages, backed 2 miles inwards by a range of sharp grassy hills, bare of wood, each defined by a belt of sharp brushwood at its base, crowding down hill upon hill with such a curious effect as to remind us strongly of the plate in Black's 'Atlas' of all the mountains in the world. Above the height of 2000 feet the forest springs up again, and covers still higher peaks to the very top, to a height of 6000 or 7000 feet.

Cape Frere is a noble headland, dropping its huge buffalo-headed mass about 2000 feet almost perpendicularly to the deep-blue sea; and the *Basilisk* looked a mere cockboat in the huge shadow, as almost scraping her sides against the beetling mass she stood in to seek for an anchorage in Bartle Bay. This bay—at the head of which an extensive tract of comparatively low land, marked by terraced plateaus, between which a considerable stream debouched through a dark sandy beach—seemed to afford the certainty of a good safe anchorage for the night; but we were doomed to disappointment—nowhere within a cable's length of the beach would 80-fathom line reach the bottom. At last we let go anchor in 49 fathoms (which is deeper than the water of the English mid-channel), our stern just swinging clear of the beach. The soil about Bartle Bay is very rich, and runs back in a series of clear-terraced elevations to a lofty inland range of mountains. The river which issues at the head of the bay has ploughed deeply through these terraces, so that its banks are exposed for a section of from 10 to 30 feet in height; they are composed of smooth water-worn stones, embedded in a light gravelly soil. We searched but could find no gold here, nor was any trace seen by us of the precious metal on the north coast of New Guinea.

From Bartle Bay into the bight of Goodenough Bay, a distance of some 30 miles, the bold and fertile coast runs in a W.N.W. direction. There are some fine waterfalls at the head of this bay, flashing down the dark-green mountain-sides, and so much river-water is here discharged that the surface of the sea is quite fresh. The canoes about here are smaller; and quite a different language prevails from that at East Cape.

From the bottom of Goodenough Bay the land turns abruptly in an E.N.E. direction, and so runs boldly out to sea for 30 miles in a rich forest-covered promontory, which ends in grassy slopes marking Cape Moresby, off which are small outlying islands, surrounded by coral-reefs. From this point, looking across Ward Hunt Straits, we could still see Mount Goodenough rearing its stupendous mass.

From Cape Moresby the land trends W.N.W. for 45 miles to the bight of Collingwood Bay, the shores of which are low and densely wooded, and the depth of water decreased to 50 fathoms at 2 miles from the shore. From this point the natives became suspicious and unfriendly, and we experienced much difficulty in communicating with them. In Collingwood Bay we cut a large quantity of firewood from the tall, fir-like trees which generally ornamented the points of land. The land now runs north-east for 45 miles till it forms a noble promontory, and terminates in Mounts Victory and Trafalgar, 3000 feet high, and Cape Nelson—names which I rejoiced to write for perhaps the last time on the map of the world. The natives here fled at our approach; and we observed that, although belonging to the light-coloured race, they differed in appearance from the natives of East Cape, and wore their hair in long, thin, ugly ringlets.

Cape Ward Hunt lies 40 miles to the westward of Cape Nelson; the deep bay between I have named "Dyke Acland." Its low wooded shores, with the formation so characteristic of this coast, suddenly turning to the north-east and forming a bold wooded promontory. Eight miles to the westward of Cape Ward Hunt is Traitors' Bay. Here I had occasion to fire my first and only shot in self-defence. Three of our officers had strayed away from a wooding-party, when from the ship we observed a party of 70 or 80 warriors land from their canoes, fully dressed in feathers and war-paint, stealing on them. Sub-Lieutenant Shortland and I jumped into the dingy with some spare rifles, and gained the beach just in time to put our shipmates on their guard and give them the rifles. Hoping to maintain friendly relations, I advanced alone, armed with a rifle, but holding my arms over my head towards the bush where the natives were lurking, quite concealed from our view. Suddenly they sprang from the bush to the open beach, and formed in two regular lines, 10 yards in my front: the first line armed with spears, which they held quivering to throw, whilst they moved with a short quick step from side to side to distract our aim, guarding themselves with shields; the second line was armed with clubs. For some seconds I forbore to fire, hoping still to preserve the peace. Finding this hopeless, and that in another second I should be the target for fifty spears, I fired with a snap-shot at the leading savage; the bullet pierced his shield and spun him round on his heel, but glancing off, did not wound him. Immediately the whole body of warriors turned in consternation at the sound of firearms, then heard by them for the first time, and ran for the canoes. We followed till we drove them on board, firing a few shot over their heads.

Passing Cape Ward Hunt we came upon the position assigned in the charts to "Richie Island," so named after the naturalist of D'Entrecasteaux's expedition 94 years since. No trace of any such *island now exists. It is* probable that D'Entrecasteaux, at a great distance, saw the high land about Cape Ward Hunt, which would then appear as islands, and thus he noted it on his chart.

Huon Gulf lies between Cape Ward Hunt and Cape Cretin, and is the last of the great bays which distinctively mark the north-east coast of New Guinea. Its shores are well populated, and the natives were friendly. For the first time in New Guinea we observed tappa-cloth used; they wore it round their waists, and made into high conical caps, which gave them all the appearance of Indian Parsees. Its shores are covered with a rich vegetation; and especially beautiful are the slopes of the Rawlinson Range, teeming with palms and tree-ferns, and well inhabited. From Cape Cretin to Astrolabe Gulf, a distance of 120 miles, the land trends nearly due east and west, without a break; the coast-line is backed up by the great Finisterre Mountains, the two highest peaks of which, standing facing each other, I have named Mount Gladstone and Mount Disraeli. At Astrolabe Gulf our survey terminated; but off the northern shores of New Guinea we took a series of deep-sea soundings, finding from 1500 to 2000 fathoms 25 miles from the shore. a depth probably unequalled in any part of the world in such close proximity to the land.

The *Basilisk* passed from Astrolabe Gulf toward Lesson Island, an active cone-shaped volcano discharging large volumes of steam and smoke. It is densely populated, and the cultivation at its base appears very rich. The natives, a fine-looking race, crowded alongside the ship, eager to barter all they possessed for scrap-iron. Their hair is worn in a preposterous manner, confined behind in a conical case projecting 12 or 14 inches, as a horn from the back of the head. Off Garnet Island the *Basilisk* passed through a large body of brackish water, forcing itself seaward and bringing with it vast numbers of gigantic uprooted trees. From this fact I conclude that a river of large dimensions must exist in the neighbourhood of Cape Della Torre.

Time will not permit me to say more. On June 2nd we reached the Dutch Spice Island of Amboyna, having thus successfully completed the survey of the last unknown coast of the habitable world.

The meteorology of Eastern New Guinea appears to be different from that previously supposed. The north-west monsoon blows from November till March, accompanied by occasional westerly gales, with fine-weather intervals. The south-east monsoon, which follows, we never found to blow continuously up to the time of our leaving the coast in May, for we experienced light variable winds and calms; whilst on the northern shores of Eastern New Guinea *the south-east* monsoon appears to be altogether arrested by the lofty

Owen Stanley Range, the summits of which, during the month of May, were observed with heavy clouds, leading us to believe that the monsoon was blowing strongly on the southern shores of the peninsula, whilst we on its northern side were sailing in calm and waveless waters.

The barometer showed little or no fluctuation, remaining steady between 29·80° and 29·90°; the thermometer in the shade varying from 83° to 86°. The tides varied in rise and fall from 8 to 12 feet.

The Natives.—Having now, as far as time would permit, treated the geographical part of my subject, I will speak of the native race which inhabits the newly-discovered portion of New Guinea. You are already aware that varieties of race exist in this great island. You know of the black Papuan who inhabits the south coast of New Guinea, apparently from Cape Valsch to Cape Possession in the Gulf of Papua. A recent Italian explorer has lately informed you of the existence of a hitherto unknown race, named Arfaks, inhabiting the mountainous parts of north-western New Guinea; and to these we must add the pure Malay race, which, coming from the isles of the Malayan Archipelago, has driven inland the aborigines of the north-west coast, and settled in their stead, as a third type of man. This last is, as you are aware, a semi-civilised Mahometan race, professing Dutch allegiance. Leaving these people, I will introduce to you a fourth—our now first visited race of Malays.

This race is distinctly Malayan; but differs from the pure Malay, being smaller in stature, coarser in feature, thicker lipped, with less hair on the face, being, in fact, almost beardless. The hair of the head is also more frizzled, though this may result from a different dressing. These men have high cheek-bones like the pure Malay; their noses are inclined to be aquiline, and sometimes very well formed; their eyes are dark and beautiful, with good eyebrows. Amongst them we met many men with light hair, and what struck us as a particularly Jewish cast of feature. They rise to a height of from 5 feet 4 to 5 feet 8 inches, are sinewy, though not muscular, slight, graceful, and eel-like in the pliability of their bodies. This race abuts on the black Papuan, somewhere in the vicinity of Cape Possession; but I do not believe that a fixed line of demarcation exists, for in Robert Hall Sound both types of race were present, and the natives varied here amongst themselves in colour, stature, and cast of feature. A mixture of habits also obtained at this point, which confirmed the idea of a fusion of race here. Some chewed the betel-nut Malay-wise, whilst others rejected it; some wore the Papuan adornment of the great bill of the hornbeak as horns on the head. All were destitute of the ornaments made of human bone generally worn by our newly-found Malay race, whilst they one and all decked themselves with flowers and berries as this race does, but the Papuan never, to our knowledge.

This new race, which presents some slight varieties in itself, appears to inhabit the whole of the eastern peninsula of New Guinea in its northern and southern shores, from about 148° of longitude, to East Cape, which is in 150° 53′ East longitude, and also the newly-discovered archipelago of islands adjacent. I approached these people with caution, knowing that no seaman had ever willingly ventured near their shores, and kept prepared for attack; but veiled my precautions, showed no distrust, and went freely amongst them. Had I been so unhappy as to have needed firearms, I should have used them with full effect, believing this to be the truest mercy; fortunately these kindly people were soon won, and greeted us everywhere with a wondering welcome. Nearing shore I always caused a seaman to stand upright in the bows of the boat, with both arms extended in sign of peace; and we landed two or three only at first, with no arms but the revolvers hid in our breasts, making gestures of friendship. Soon they smiled, and made responses to our signs; drew nearer and touched our white skins, turning up our sleeves and trousers to see if this amazing white colour held all through; and we gave them gifts and soon got to bartering, in which they showed great honesty. The young women, some of whom were really pretty and graceful, were particularly curious about us; but if we ventured to touch their dark shapely limbs, they fled away with a start and a scream, and seldom returned. Those natives are not devoid of principle, I am sure. I once attempted to barter an axe with a boy for a handsome shell-necklace he wore. He made signs that the necklace was not his, and refused to trade; his companions urged him vehemently, even trying to force it off his neck, and at last so far prevailed that he took the axe from my hand and half-unfastened the necklace. Conscience pricked him, and he hurriedly thrust back the axe, and making signs that he would go and get leave from the owner to sell it, he paddled off in spite of the jeers of his friends.

When the *Basilisk* first discovered Moresby Island, and cast anchor in Hoop-Iron Bay, we could see the natives on shore rushing frantically about: finally a fleet of canoes, containing men only, came off and hovered about us, showing no arms, but wearing bird-of-Paradise plumes, and handsome shell-disks on the side of the head. These disks they shifted to their hips when once convinced of our pacific intentions. I have a heartfelt pleasure in stating that all our subsequent intercourse with these people was marked with good feeling and kindliness on both sides. Their single evil propensity seems to be a love of pilfering; and it was amusing to see their skill in hiding small articles in the large orifice they make in the lobe of the ear, or between the tight ligatures they wear as belts and armlets, and their skin. They steal skilfully also. Having adroitly knocked some nails, or an instrument off the carpenter's bench, or secretly unscrewed a nut, they would walk over the side, concealing it under the hollow of the foot. I thought it wise to overlook these small delinquencies; but on one occasion they went a step too far. H.M.S. *Sandfly* (under my orders), when lying in Possession Bay, had sent a boat on shore with four men for water, and the natives had stolen their water-barricoes and boat's crutches, and all the iron-hoop they had about them. I directed Lieutenant Nowell to lay an ambush and seize some natives; and two were secured accordingly, after a long struggle, in which their smooth skin and supple limbs eluded the attempts of our strong seamen. They were taken on board the *Sandfly* and kindly treated, but evidently expected instant death. Their wives and friends came off weeping, and offering presents to buy them off. The natives deserted the ship, and kept close to the shore in their canoes ready for flight into the bush: however, I went amongst them in a dingy, and succeeded in making them understand that our prisoners should be liberated on the restoration of the stolen property. On the second day the articles were brought back, and we released the men, to the intense delight of their friends, who then sent a large hog on board the *Sandfly* to show their gratitude. A few days afterwards our carpenters, working over the ship's side, missed a saw, but before we could take any step, we beheld a large canoe coming off in which an old man stood holding up the saw, and on reaching us he returned it, and expressed his anger at the theft.

I incline to the belief that these people have not any religious feelings. They certainly have no external form of showing such, or we should have observed it; for with the same limited opportunities of observation we distinguished many observances as distinctly religious at all the other South Sea Islands visited by us. For instance, at the New Hebrides there was an organised system of devil-worship, with duly appointed priests and rites: idols also were everywhere to be found. Here, however, no idols were to be

seen. Occasionally grotesque nude figures
and white ochre on the ends of the houses,
One action only seemed to have a religious te
universal custom of bringing a village dog a
out in our presence, after which ceremony
friendliness. We noticed, also, that in every
much bedizened with ornaments and ropes
seemed to hold a certain sort of authority.

They bury their dead in a respectful manne
build small thatched huts over them, on w
hung. These coco-nuts, hung plentifully in th
far out on the reefs, may have been votive-offe
cases these burial-huts are rudely carved an
bamboo palisade, as if the resting-places of chi
sign of chieftainship amongst the living.

These Malays must be considered a more
the Papuan; they possess the art of pottery, st
Papuans. In every village women may be seen
whilst others tend the wood-fires in which the glo
They are also better cooks; for they boil their fo
and bake it like the Papuans; and I have freq
vegetable porridge they make of yams, taro, a
stewed in these bowls, with coco-nut shred finely

As fishers they far exceed the Papuans in art:
with hook and line and the barbed spear, whil
make fishing-nets of various sorts with great s
English sein, made with the fibre of a small
have before mentioned; another is what I will
and consists of a netted bag, with the mouth kept
spring. It is let down with the bait in the botto
The fisher, on feeling a fish, pulls a string which
draws it up with his prey.

The Papuans have but one kind of canoe, dug
and balanced by heavy out-riggers; but these
kinds of canoes, of which the trading-canoe is b
laced on with split bamboo, strengthened by s
supporting a sort of half-deck, under which th
They are most ingenious basket-makers, and
looking baskets to fit one inside the other in a
capital woven-bags for carrying their propert
light rope and strong cord from various vegeta
not disgrace an English rope-yard.

Their weapons consist of stone tomahawks

ıich he had recently sent home, Mr. Murray had, however,
ırt Moresby the population was unmixed, and were exactl
ıabitants of the Navigators' Islands. Though but little wa
ɜw Guinea, what had been done was by no means to be de
e past five years, by constant visits to the different island
ıvellers, and merchants, and missionaries, had been so ex
ople, that the whole of the islands might now be visited in
hen Mr. Murray was in the neighbourhood of York Island,
found a ship loaded with coal which had gone on shore. He
ɜw, but they had disappeared, evidently fearing to land becaus
ıt had been current in all the Australian papers and in the
oks. The directory of travel in the Papuan Gulf ought, ho
ıered, to be entirely rewritten; for, if accidents occurred, seam
ıd with perfect fearlessness. In one case the natives relieve
ɜw, fed them, helped them to repair their boats, and finally sa
ely towards the mainland of Australia. It was true that the
ıt coast were addicted to pilfering, but they were amenable to
gument, and, when well treated, were anxious to learn, and t
ırse with their visitors on fair and equal terms. The miss
tered the Katau River immediately opposite Cornwallis Island.
o the interior, and is at least two miles wide, while a station
ıchers had been formed in a large village on the mainland. An
d been founded at Port Moresby, and he hoped that hereaf
naries would be able to enter freely into the D'Entrecasteaux Isl
ı little steam-launch which they possessed he hoped that th
le to add to the geographical knowledge of the country.

The Rev. Mr. Gould asked in what way communication had
between the natives and the missionaries; and how far any a
d been obtained with the Papuan language?

Dr. Mullens replied, that when Mr. Murray and Mr. MacFarlan
ɜre, they took with them natives of the Loyalty Islands, who be
ınch of the Papuan race, and who therefore knew the roots of
ıguage pretty well. When they first held intercourse with th
ırnley Island and Murray Island, they at once discerned a similar
ıir own tongue and that of the natives of those islands, though
ıe there were considerable differences. They also had one or two
ıo had come from the Loyalty Islands and New Caledonia, but wl
ing among the Papuans of the Gulf. Since then the native t
ın living for two years on the islands in the Papuan Gulf, and wer
rly to master the local tongues; and from the education they l
ɜy were quite aware of the alphabet by which these new tongu
oressed.

Mr. P. L. Sclater said that New Guinea was of special inter
ists, on account of the many wonderful forms of animal life th
ɜre, and particularly because, so far as was at present known, t
ıadise were confined to that and the neighbouring islands. I
ırers had directed their attention only to that part of the island
st of Geelvink Bay. The Dutch had dominion over the w
olucca Islands, and they were the first who explored that end of
eir earliest settlements were in Geelvink Bay, and they also pa
Clure's Inlet. Then one of the great French expeditions passe
Port Dorey, and made some collections in natural history. Mr.
ınt a considerable time there, and within the last two or thr
re the obvious advantages to be derived from an expedition to
ıt naturalists from three different parts of the world had gone t
M. D'Albertis and Dr. Beccari, two Italian gentlemen, Dr.
, and M. Miklucho Maclay, a Russian; but they had

were somewhat civilized was due to the pearl-shellers, who had brought natives from other islands there, but had treated the islanders themselves with kindness in order that they might safely carry on their trade. This was the reason why seamen wrecked in that part might be treated kindly, but certainly they must not expect it as a matter of course. As regards the River Katau, the entrance had been trigonometrically surveyed by the officers of the *Basilisk*, and laid down upon the charts. The tribe at Traitors' Bay, on the northern shores of New Guinea, who so ignominiously fled from him, did not allow him any opportunity of communicating with them; but they were apparently of the Malay race, differing, however, from the other Malays to the east in their mode of dress and their disposition. In fact, as he left the southern and eastern shores, and advanced northward and westward, the natives became gradually more and more fierce. Their colour was the same as that of those he had first met with, but their manner of wearing the hair different. He did not profess to be any authority as to the languages, but he did not think there was any such analogy as Dr. Mullens had spoken of. The native teachers of the London Missionary Society were quite unable to hold any communication with the inhabitants of New Guinea, even after a residence of some months among them. The language of the copper-coloured race was entirely different from that of the black Papuans, and, in fact, tribes within 100 miles of each other differed in their languages.

The PRESIDENT, in conclusion, said the lateness of the hour would not permit the reading of the second paper that had been announced, on the Yang-tsze-kiang, by Mr. Oxenham, but it would be printed *in extenso*, with a map, in the 'Journal.' He was quite aware that a great part of New Guinea had not been explored, but it had been tapped in so many places that it could no longer be regarded as a *terra incognita*. Mr. Meyer had actually crossed it from one side to the other, and Mr. D'Albertis intended to go as far inland as he possibly could. The Russian savant, Mr. Maclay, had also gone back to the island, so that considerable progress was being made. No doubt Sir Charles Nicholson's suggestion as to the desirability of establishing some protection there deserved great attention, and perhaps the present was a most favourable time for bringing the subject before the Government. The Protectorate of the Fiji Isles had only recently been assumed, and it would not be a very great step further to occupy some point so as to guard the line of traffic between Australia and Eastern Asia. Rumours were occasionally heard of a scheme for forming a great confederation of Australia, Tasmania, and New Zealand, but it would be long before such an idea would be realised. In the mean time all that England could do was to endeavour to spread humanising and Christianising influence by means of her officers, her travellers, and her missionaries. No one could question that missionaries had been successful, to a certain extent, in civilising the races with whom they came in contact, and the Royal Geographical Society was very much indebted to them for the information which they had occasionally given of the general geography of the countries they had visited.

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2. *On the Inundations of the Yang-tsze-Kiang.* By E. L. OXENHAM, F.R.G.S.

[This Paper will be published entire, with a Map, in the next volume of the 'Journal.']

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[PUBLISHED APRIL 30TH, 1875.]

SESSION 1874-5.

Eighth Meeting, 8th March, 1875.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Edward W. Foss, Esq.; Capt. Charles P. Wilson.*

ELECTIONS.—*Thomas R. Andrews, Esq.*, J.P.; *Hon. James Bain* (Lord Provost of Glasgow); *Neil Bannatyne, Esq.; Major C. E. Bates; Joshua Peter Bell, Esq.; H. B. Cotterill, Esq.; General Frederick Cotton,* R.E.; *Henry Richard Farrer, Esq.; James W. Goodinge, Esq.; W. Edward Parry Hooper, Esq.; John Hunter, Esq.; Arthur W. Jones, Esq.; Alfred Luckman, Esq.; John Smyth-Osbourne, jun., Esq.; Sir Charles E. F. Stirling; William Henry Trinder, Esq.; Capt. J. Fenwick Wilkinson* (late King's Own Light Infantry); *The Marquis of Winchester.*

DONATIONS TO THE LIBRARY FROM FEBRUARY 23RD TO 8TH MARCH, 1875.—Mongolia and the Country of Tangus, Vol. I. (in Russian); by N. Prjevalski, 1875 (*The Russian Geographical Society*). United States Hydrographic Office publications, No. 61: the Rio de la Plata; by H. S. Gorringe, 1875 (*Commodore R. H. Wyman*). Quer durch Afrika; by G. Rohlfs, Vol. II., 1875 (*Author*). Selections from Records of the Government of India, Nos. CXIII. and CXIV.; and Selections from the Records of the Madras Government, No. XXXVII. (*The India Office*). The Threshold of the Unknown Region; by C. R. Markham, 3rd edition, 1875 (*Author*). On the Possibility of applying the Roman Alphabet to the Languages of India; by F. Drew, 1875 (*Author*). Babad Tanah Djawi in proza (1647), Vol. I., by I. I. Meinsma, 1874; Uranographie Chinoise, parts 1 and 2; and Atlas céleste Chinois et Grec, by G. Schlegel, 1875 (*The Royal Institute of Philology, &c., of Dutch East India*). And the current issues of corresponding Societies, &c.

DONATIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF FEBRUARY 22ND, 1875.—Carte Hydrologique du Département de Seine-et-Marne. Executée par M. Delesse, on 2 sheets (*Author*). Case's Map of the United States, the British Provinces of Mexico, and part of the West Indies, on 9 sheets (*W. and A. K. Johnston, Edinburgh*). Photograph of an ancient Map of Gloucestershire in the year 1610 (*Lord de Blaquiere*, F.R.G.S.). 2 Maps by the Ordnance Survey, the Parishes of Gresford (Denbigh) and Folkestone (Kent) (*Sir H. James, Director*).

The PRESIDENT, in introducing the subject of the evening, reminded the Society that at the meeting of December 14th, a letter had been read from Lieut. Cameron, announcing that he had circumnavigated Lake Tanganyika, and had discovered its outlet. Until the present meeting, however, the Council had not been able to bring the full result of his labours before the Society. Whenever Lake Tanganyika was mentioned, it should be remembered that its first discovery was due to the perseverance and energy of that pioneer of African Equatorial civilisation, Captain Burton. It was in the year 1858 that Captain Burton and Captain Speke first reached its shores. Eleven years after that it was visited by Dr. Livingstone, who was subsequently joined by Mr. Stanley; and in February, 1874, Lieut. Cameron reached its shores. It was gratifying to see the parents of that meritorious young officer present that evening to receive the tribute due to their son's energy and perseverance. Mr. Markham, who had always taken great interest in African exploration, had extracted the chief passages from Cameron's diaries, the entries in which were necessarily somewhat disjointed, and had formed them into a connected narrative. Tanganyika was one of the largest freshwater lakes in the world, being 350 miles in length, and extending over a superficies of above 10,000 square miles. Hitherto it had been laid down on the maps generally in a northern and southern direction; but Lieut. Cameron's observations, which to a certain extent were anticipated by Dr. Livingstone, showed that its real direction was N.N.W. by S.S.E.

The following paper was read:—

Examination of the Southern Half of Lake Tanganyika. By LIEUT. V. L. CAMERON, R.N.; compiled chiefly from Lieut. Cameron's Diary, by C. R. MARKHAM, ESQ., C.B., F.R.S., Secretary R.G.S.*

THE geographical work performed by Lieutenant Cameron during his voyage round the southern half of Lake Tanganyika will form the principal part of the present paper. The explorer has transmitted his journals to this country in the form of diaries, entered day by day. This is quite right, and it is the form most valuable to our map compilers, and to those whose business it is to examine and scrutinize the work. It is not, of course, a form which is adapted for reading, and it has consequently been necessary to recast the portions of Cameron's notes which are to be brought to your notice, into the shape of a consecutive narrative, at the same time using his own words as closely as possible. I have undertaken this task with some diffidence; but I hope to be able to bring before you the principal points, and to do justice to our absent countryman.

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* *Vide* Map, in present volume of the 'Proceedings,' No. ii. p. 73.

Lieutenant Cameron's discoveries did not commence with his survey of the lake. Even when travelling over trodden ground, from Bagamoyo to Unyanyembe, he took regular astronomical and hypsometrical observations, and has sent home careful route-maps and journals. After leaving Unyanyembe, he selected a route to the south of that of Captain Burton, and to the north of Mr. Stanley's route, which enabled him to explore a previously unknown tract, and to make discoveries connected with the drainage-system of the southern part of the basin of the River Malagarazi, the most important eastern tributary of Lake Tanganyika. He crossed the River Ngombe, which flows through a lovely, though perfectly flat country, with open glades of bright green grass, interspersed with numerous clumps of trees and shrubs. Water-lilies were abundant, and the views of the reaches, with green turf down to the water's edge, were enchanting. The clumps of fine trees were disposed as if planted by a landscape-gardener, most of them growing on little eminences, and some on the water's edge with their branches dipping in the stream. The Ngombe falls into the Malagarazi.

Westward of the Ngombe, in the country of Ugara, the dead level continues for many miles, and then gradually rises towards a high range of hills. Here the River Mtumbo, rising in the southern part of Utendi, drains the eastern slopes, receiving many smaller streams and brawling torrents of beautifully clear water, and uniting with the Sindé close to its junction with the Malagarazi. The two rivers, Mtumbo and Sindé, discovered and explored by Lieutenant Cameron, are thus, with the Ngombe, the principal southern feeders of the Malagarazi, and west of the Mtumbo the country is more broken, but fertile and well wooded. This is the country of Uvenda. The marches were through a mountainous region with precipitous slopes of granite rock, and hills clothed with trees to their summits. Cameron ascended to the summit-ridge of this range, whence there was a splendid view stretching over rocky hills, expanses of emerald plain, and masses of sombre forest. The villages are built on the tops of precipices, or among rocks, as some defence against the slave-dealing Arabs. The travellers crossed the River Sindé on a natural grass-bridge, so firm as to appear solid ground, the river being a hundred yards wide, and the growth forming a natural bridge about half-a-mile long. The hill-country ends on the left bank of the Sindé, forming bluffs and capes that rise out of the plain. On reaching the Malagarazi at Ugaga, which he found to be 3048 feet above the sea, Cameron came upon the route traversed by Burton and Speke in 1858, which he followed to Lake Tanganyika. His latitudes, here, and again at Mpeti, a little further on, agree to a few seconds with those observed at the same places by Speke. This is very satisfactory, as establishing the correctness of both observers. Thus Lieutenant Cameron discovered and explored, in this first part of his journey, the principal southern feeders of the River Malagarazi, and an important range of mountains along the left bank of the River Sindé. His work completes the examination of this part of the Malagarazi basin, and is an important contribution to our knowledge of African geography.

Cameron got his first sight of Lake Tanganyika on the very same day in February that Burton discovered it, just sixteen years before. He reached Kawele (Ujiji) the next day, being the 22nd of February, 1874.

Before entering upon the details of the service that Lieutenant Cameron has done to geography, by the examination of the southern half of the lake, it will probably be acceptable if I recapitulate, very briefly, the extent to which this most interesting sheet of water had previously been examined by Burton and Speke in 1858, and by Livingstone and Stanley in 1871, and the conclusions respecting the hydrography of the Tanganyika which were arrived at by those explorers. The exact scope and nature of the work which remained for Cameron to do will then be more clearly evident.

Captain Speke crossed from Ujiji to the island of Kasenge, near the western shore, in March; and Captains Burton and Speke explored the portion of the lake north of Ujiji, in two open canoes, in April and May. Burton also collected an extraordinary amount of information from the Arabs. As the result of his exploration and inquiries, he states his general views respecting the lake. He describes it as giving him the impression that it was a volcano of depression rather than a reservoir formed by the drainage of mountains. As regards the northern half, the walls of the Tanganyika basin rise in an almost continuous curtain to a height of 2000 or 3000 feet. Burton found the water of Tanganyika to be deliciously sweet; yet a careful investigation led him to the belief that the lake receives and absorbs the whole river-system of that portion of the Central African depression, whose watershed converges *towards* the great reservoir. Burton and Speke, owing to failure of provisions, were unable to reach the northern extremity, but they were informed that the Rusizi flowed into the lake at its northern, and the Marungu at its southern end. Burton had himself descended the incline for 240 miles, on the eastern side, until he came to the shores of the lake, and had seen that the Malagarazi and other rivers flowed into it. He therefore conjectured that Lake Tanganyika had no outlet, suggesting that it maintains its level by an exact balance of supply and evaporation. He accounted for the freshness of the water by the saline particles deposited in it being wanting in some constituent which renders the salt evident to the taste. This view was always supported by our late medallist, Dr. Beke.

Dr. Livingstone and Mr. Stanley, following in the track of Captains Burton and Speke, explored the northern half of the lake in November, 1871, and succeeded in reaching the mouth of the Rusizi, which was filled with large, reedy, sedgy islets. There was a current of two miles an hour flowing into the lake. The latitude was 3° 18′ 3″ s. On leaving Ujiji a second time, Livingstone and Stanley coasted along the east shore to the south, from December 27th, 1871, to January 2nd, 1872, as far as Urimba, where they landed.

Thus the northern half of the lake had been well explored from Urimba on the east side, and Kasenge Island on the west, to the northern extremity. But, when Cameron reached Ujiji, the southern half had never been explored, and was unknown except at a few points where it had been touched by Livingstone in his various journeys.

In 1868 Dr. Livingstone reached the southern extremity of the lake, which he describes as a deep basin, with sides perpendicular and covered with trees; the rocks a red argillaceous schist, down which flow several cascades. He was at the village of Pambete on the shore, and fixed the latitude at 8° 46′ 54″ s. This latitude is very important, as will presently be seen, because it furnishes independent evidence of the accuracy of Cameron's work. On February 14th, 1869, when very ill, Livingstone again reached Lake Tanganyika at a point on the west coast, under the escort of his Arab friend Muhammad Bugharib. The place was called Parra, at the confluence of the River Lofuko. He embarked on the 26th, but his illness was so severe that there was no attempt at an examination of the coast; and the voyage is described in half a page. Dr. Livingstone makes one remark of interest relating to the lake in this part of his Journal. He says:—"Tanganyika has many deep bays running *in four or five miles; they* are choked up with aquatic vegetation, through which canoes can scarcely be propelled. When the bay has a small rivulet at its head, the water in the bay is decidedly brackish, though the rivulet be fresh; but as soon as we get out of the shut-in bay or lagoon into the lake proper the water is quite sweet, and shows that a current flows through the middle of the lake lengthways."

During his stay at Ujiji, Dr. Livingstone attentively observed the phenomena of the lake. He found that the water was encroaching on the eastern side, and that there was a current from south to north. The Ujiji Arabs were of opinion that all the water, both in the south and north, flowed into the lake, but where it then goes they have no conception. The current flows north from February to November. Evaporation is at its strongest in the south part in November, and there is a southerly current from November to February. The flow and reflow are the effect of the rains and evaporation. The floods of the great rains in February again drive the water north. But for the current, Dr. Livingstone believes that the lake would be covered with *tika-tika* or aquatic vegetation. He crossed the lake again to Kasenge Island in July, 1869. On his last journey Dr. Livingstone skirted parts of the south-eastern shore of the lake. He first sighted it on October 8th, 1872; and saw it at a distance again on the 11th. On the 13th he travelled along the top of a range of hills lying parallel to the lake, and 1000 feet above it, and he continued to skirt the shores until the end of November. In latitude 7° 52′ s. he gives the width of the lake at 12 or 15 miles.

Dr. Livingstone, in July, 1869, seems to have held the opinion that Tanganyika has no outlet; for he says, were it not for the current, the water would be salt. In November, 1871, he had not the slightest doubt that the lake discharged somewhere, and says that the outlet of the lake is probably by the Rogumba River into the Lualaba. But the Rogumba, or Logumba, certainly falls *into* the lake.

Such was the state of knowledge when Lieut. Cameron reached Ujiji. Excepting that Dr. Livingstone had visited Pambete on the southern coast, and had skirted along a portion of the south-eastern side, often at some distance, the southern half of the lake from Urimba on the east side, round the south end, to Kasenge Island, near the western shore, was unknown, and required to be explored. Moreover, if there was an outlet at all, it must be somewhere along this unexplored coast-line of nearly 600 miles, for the northern half of the lake had been twice examined. There was a geographical discovery of the first importance to be made which was involved in the careful examination of the southern half of the lake, and Lieutenant Cameron has now achieved this discovery.

His first duty was to establish a good point of departure, by fixing the position of Ujiji; and, in the instructions given to him by Sir Bartle Frere, he was also specially enjoined to ascertain accurately the height of Lake Tanganyika above the level of the sea.

Lieutenant Cameron found the latitude of Ujiji, by meridian altitudes, to be 4° 58′ 3″ S., and by dead reckoning 4° 55′ 30″ S. His longitude of Ujiji, by lunar observations, is 30° 4′ 30″ E., by dead reckoning 29° 59′ 30″ E. The point of departure for the dead reckoning was at a distance of 200 miles, checked only by meridian altitudes, so that the results establish confidence in all the intermediate work. His observations for ascertaining the height of Lake Tanganyika above the level of the sea are by far the most complete that have ever been made either on or near any of those inter-tropical African lakes. On February 27th Cameron observed, with seven of Casella's boiling-point thermometers, which gave the mean result as 207° 54′, and recorded the barometric height and temperature simultaneously. Next day he observed with two of the mercurial barometers invented by our Map-Curator, Captain George, which he filled on the spot. He also observed with four aneroids, the results of which cannot yet be computed; but there was almost an exact agreement between the thermometer and barometer observations. The height of the lake proved to be 2710 feet.

Cameron's result is more satisfactory than any that had previously been obtained, because it was got by several methods; and this was the first time that a mercurial barometer had ever been used here. But it corroborates the general accuracy of Dr. Livingstone's former observation; and in this instance, as well as in his survey of the lake, Lieutenant Cameron has done a service to the memory of his great predecessor, in having established the correctness of his work by independent evidence: for Cameron was entirely unacquainted with Livingstone's results. This consequence of his labours will give the young Lieutenant, who suffered so much with the object of succouring Livingstone, even more pleasure than can be produced by the feeling that he has achieved a distinguished place as an African explorer.

Having thus carefully established a fixed point of departure, Cameron made preparations for his great work—the thorough examination of the southern half of Lake Tanganyika.

After much difficulty he secured two suitable canoes, and fitted one with mast and sail. He marked a lead line up to 65 fathoms, and contrived a waggon-roof awning for the stern sheets of the boat.

The larger canoe received the name of the *Betsy;* the smaller one, serving as a tender, was christened the *Pickle.* Two guides were hired, who had a knowledge of the lake and of the names of the different points and bays, and the little expedition started in the afternoon of the 13th of March, 1874.

He shaped his course to the southward, along the east coast of the lake, and describes the portion between Ujiji and the Cape of Kabogo as very beautiful. The red cliffs and hanging woods reminded him of Mount Edgecombe. The gorges and ravines were full of trees, with red shingly beaches at intervals.

The canoe-men could not be induced to leave the shore, nor even to cross a bay from point to point, through fear of the waves; so that they coasted along round every indentation, and, while causing much delay, at the same time enabled a most complete and detailed survey to be made.

Dr. Livingstone and Mr. Stanley had coasted along this side of the lake as far as Urimba, where there is a great bay; and the completely new work of Cameron commenced at the Cape of Kungwe, which he rounded on the 23rd of March. It was off Kungwe that he was first informed that a river, called the Lukuga, on the opposide side, flowed out of the lake.

Owing to the two shores overlapping to the south, it appeared like the extremity of the lake. Torrents flowed down the sides of the hills, looking like silver threads dividing the dark-green slopes; and the opposite shore was much nearer, the width not being more than 15 miles. The lake is frequented by numerous birds, such as fish-hawks, kingfishers, divers, darters, cormorants, and gulls, besides swallows and martins.

Here, as in other places throughout the journal, there is incidental evidence of the sufferings and hardships which were gallantly faced and overcome by the solitary young explorer, in the performance of this arduous service. He was several times attacked by fever, was even delirious at one time, constantly in pain from boils and other ailments, and in great discomfort. At Kinyori he says: "Very heavy rain in the night, and very miserable, as everything got wet. I got on a waterproof and surveyed the dismal ruins—bed, books, chart, guns, and all flooded. I put my head between my knees after having gathered what I could under the cover of the waterproof, and sat like an old hen on a brood of chickens." These serious hardships and difficulties enhance the value of the work done, some portion of the results of which are now displayed on the wall before you. After the miserable night just described, Cameron *quietly observes:* "I suppose it is good for me to have these little bothers, as if everything went smooth there would be little to do." Next day the canoes rounded Cape Kalewyi, about the narrowest part of the lake.

The results of his observations up to this point impressed Cameron very strongly with the opinion that there must be an outlet to the lake. He had seen such an amount of water flowing into it, that it seemed to him impossible to dispose of all the surplus water by evaporation. Besides which, so many streams flow through salt soils that, if the water were disposed of by evaporation, the lake would be as salt as brine.

On the 28th the canoes passed through the strait between the island of Katogo and the mainland, across the entrance of which a bar had formed. The island is well cultivated, and fan-palms are numerous, the fruit of which is eaten; but the people do not make toddy. On the opposite shore, at Ras Kafeesa, the village is approached by a long canal in the rushes, and is populous and extensive. The coast-line still trends to the eastward into a deep bay. This place seems to be a centre of some trade with the Arabs in ivory and slaves, and the people have cattle and plenty of provisions. The name of the village is Karyan-gwina.

On April 3rd Cameron encamped at the mouth of a river called the Musamwira, which he found to be the drain of the Likwa into the Tanganyika. His observations agree with those of Dr. Livingstone, that the lake is encroaching along the eastern shore. The spit and shoal at the mouth of the Musamwira occupy a spot where, a few years ago, there was a large village, and a group of islands further south was said to have been part of the mainland within living memory. The discovery of the Musamwira, and that it is the drain of the lake of Likwa (called by Burton, Rukwa or Ikwa) is noteworthy. Burton's information was that, after heavy rains, this lake was connected with Tanganyika; but the point had since been doubted, and the discovery of the connecting channel is an important link in the chain of evidence relating to Tanganyika hydrography.

On the 7th of April Cameron reached the Cape of M'pimbwe, the point where Dr. Livingstone first sighted this part of the lake during his last journey. This promontory is formed of enormous blocks of granite, overgrown with trees in the cracks and crevices.

A few days afterwards, on the 14th, the southern extremity of the lake came in sight. Here the islands are numerous off the shore, and the scenery increased in beauty. Cameron thus describes it: "On the outer side of Pulungu Island the rocks are in enormous masses, scattered and piled in the most fantastic manner, the whole overgrown with trees jutting out from every crevice, whence hang green creepers, 50 or 60 feet long. Through the festooning fringe thus formed, glimpses are caught of dark hollows and caves. The scene appeared either as if designed for testing the capabilities of a stereoscope, or else for some grand transformation scene in a pantomime, and one almost expects the rocks to open, and sprites and fairies to come out. As one pauses to look at the wondrous sight, all is still, not a sign of life. Suddenly the long creepers begin to move, a flash of brown, another and another, and there is a troop of monkeys swinging themselves along. They stop and hang by one paw to chatter and gibber at the strange sight of a boat—a shout and they are gone. The glorious lake, with its heaving bosom, lies bathed in tropical sunshine, or darkened by some passing squall." On the 17th of April the southern extremity of the lake was reached. The shore was lined with high cliffs, having all the appearance of ruined ramparts.

Cameron, in several parts of his journal, furnishes interesting notes respecting the floating islands and aquatic vegetation. "*Tingy-tingy*" is the name for the grassy obstructions at the mouths of rivers, too thick for boats to pass but not strong enough for men to walk upon, and *Sindy* is the name when it will bear men. Thus the Keriembwe River (Kalambo of Livingstone) at the south-east corner of the lake, is said to be all *tingy-tingy*, with a little *sindy*. The floating islands of Lake Tanganyika are formed of the long cane-grass called *matèlè*. It grows very thick and gets other vegetation matted in at the water-line, forming a sort of floating peaty soil in which the young *matèlè* takes root. The old grass in time dies and is set free, and when a favourable wind or current occurs, the island thus formed starts on its cruise. It is somewhat in this way, also, that the grass-bridges are formed over rivers. The Musamwira, for a great part of its course, is covered with them.

On April 21st the explorer reached Akahenga, one of the largest villages he had seen in Africa, and, shaping his course to the northward, he commenced the examination of the western side of the lake. On the 23rd he passed the mouth of the River Runangwa, between very high rocky hills, covered with trees to their summits; and here a couple of *soko*, the ape also seen by Livingstone in the Manyuema country, were observed among the trees and rocks. They are described by Cameron as looking bigger than men, and are said to build a fresh house every day. The Runangwa River is the Marungu of Burton, which, according to his Arab information, flowed into the lake at its southern extremity. It, however, *proved to* be about 80 miles from the southern end, and on the western shore. At the same time the most southern ferry used by the Arabs appears to be at this point, and the Marungu was doubtless the furthest point to the south with which they were acquainted. Hence the information supplied to Captain Burton.

On the 26th the canoes sailed along a coast where there was much cultivation and small villages without stockades, showing that the country enjoyed more quiet than that on the eastern side. It came on to blow, and Cameron took in a reef in his sail by twisting the tack into a rope for a couple of feet and lashing it. A second reef was effected by a lashing round the after yard-arm. A good sea was running, with the wind aft; and Cameron calculated the waves to be sometimes 12 feet from trough to ridge.

After rounding Ras Tembwe the hills began to disappear, and the land became low, the points being inconspicuous, so that the bearings were of little use. On the 2nd of May a river called the Lukuga was approached, which the chief, named Luluki, described as flowing out of the lake, but as being much obstructed by grass. On this part of the coast the hills turn right back, both on the Kasenge side and on the south side of the Lukuga; and no high land is in sight in the distance.

At 11.40 A.M. on the 3rd of May, Cameron entered the Lukuga, and the chief came to visit him, stating that the navigation was difficult, that there was much "*tingy-tingy*" and "*sindy*," but that the river flowed from the lake into the Lualaba, and that his people travel for a month by it on their way to Nyangwe to trade. No Arab had ever been down it, which explains their ignorance on the subject.

On the 4th of May Cameron descended the River Lukuga for five miles, and found it to be from 3 to 5 fathoms deep, and 500 to 600 yards wide. Here he was stopped by grass, but the chief, who accompanied him, said that a way for small canoes could be cut through it. The Lukuga is 1½ mile wide at the entrance. Grassy sandbanks, extending from the north side, leave only a clear entrance at the south end, where there is a bar, or more properly a *sill* of 9 feet, on which the surf beats pretty heavily at times. Over the sill the water immediately deepens to 4 or 5 fathoms. Five miles down the river, and close to the obstructing grass, the depth was 3 fathoms. The canoe was anchored inside the sill out of the wind, and she swung round quickly to a current flowing out of the lake. Bits of wood thrown into the water showed that the current was flowing out at a rate a little over a knot an hour. There had, however, been heavy breezes for some time up the lake *from the south, and* for part of the time the wind was blowing right up the Lukuga. But he did not believe that the wind could set the current back to such an extent; for he saw great pieces of drift-wood, 20 to 30 feet long, floating from the lake down the river until they disappeared in the obstructing grass. Another remarkable circumstance was that, whereas in all other rivers flowing into the lake the water was perfectly sweet, in the Lukuga the water had exactly the same taste as that of the lake, which Cameron describes as not salt, but peculiar. After leaving the Lukuga the breeze freshened, and they put into a convenient inlet a short distance to the north, which they found to be a part of the Lukuga. The coast consists of marsh and low flat plains, with some small openings with deep water in places, shoals, sandbanks, and long grass inside. Cameron formed the opinion that this low swampy bit of coast was formed of all the drift-matter of the lake gravitating towards its outlet, and then, there not being a fair passage for it, forming the bank and morass. This small inlet is merely a break in the bank, and the water works a way through the grass into the Lukuga.

Half-way to the Lualaba, the Lukuga was reported to receive another river called the Lurumbuji.

The River Logumba of Livingstone, which he mentions as the probable outlet, flows into the lake near the island of Kasenge, after a course nearly parallel to the shore.

On the 6th, Cameron arrived at Kasenge, and the group of other islands first visited by Speke in 1858, and three times by Dr. Livingstone. They are only about 10 miles from the Lukuga River. Cameron made a survey of them; on the 7th he crossed the lake where the width was 24 miles, and arrived at Kawele (Ujiji), on the 9th, after an absence of 88 days. The resulting chart is on a scale of 5 miles to the inch; constant bearings and cross-bearings, corrected for variation, were taken, and the work was plotted on the chart at the end of each day. The fixed point of departure was at Ujiji, and two other meridian altitudes serve to check the dead reckoning. But independent evidence is furnished of its accuracy by Dr. Livingstone's latitude of the southern end, and by his general map of the lake, of which Cameron was ignorant, but which agrees remarkably well with his chart.

The most interesting part of this survey is the discovery of the Lukuga outlet. Lieutenant Cameron himself is inclined to doubt the outflow being constant, and to think that, in the dry season, or when the lake is at its lowest level, little or no water leaves it. He, therefore, resolved to make a further and more extended *examination* of the Lukuga on his way to the Lualaba; and by this time his intention no doubt has been carried out, although we may not receive the results for a long time. Meanwhile the various facts already recorded respecting the width and depth of the Lukuga, its current, the nature of the bars and sand-banks, the taste of the water, &c., will supply material for speculation and for interesting discussion, especially if they are considered in relation to the size and shape of Lake Tanganyika, and to its general hydrography. The difference of latitude between the northern and southern extremities of the lake is 5° 29′, or 329 miles, and the whole length something greater, while the width varies from 10 to 25 miles. The level of the lake is said to vary from 8 to 10 feet between the end of the rainy and the end of the dry season, and the rivers become much diminished in size. The current flows from north to south during two-thirds of the year, from February to November, and to the south from November to February, when evaporation is at its strongest at the southern end. Thus the general flow of the current is due to causes connected with the course of the seasons and with the winds, and is not influenced by the position of the outlet.

With these facts before us, it will be interesting to consider the phenomena described by Cameron in connection with the Lukuga. That it is an outlet is beyond dispute, for the current was observed to be flowing out, huge pieces of wood were being drifted down, and the rate was actually measured in a position clear of the wind. The question is, therefore, whether the outflow is permanent or temporary; and the first point is its sluggish character. The current was only flowing out at a rate of about a mile an hour, but this is no reason for doubting the permanency of the outflow. One of our most distinguished medallists recently pointed out that rivers flowing from lakes do not, as a rule, issue with strong currents, even though these rivers have, lower down, a very strong current with rapids or falls. The Niagara River, in the words of Sir Charles Lyell, "glides along at first with a clear, smooth, and tranquil current." The St. Lawrence, too, issues calmly from Lake Ontario. The River Kirkaig, on the west coast of Sutherlandshire, when "in spate," issues from Lake Kirkaig with a trivial current, though afterwards it has a fall of 30 or 40 feet, and is a torrent nearly all the way to the sea. Its neighbour, the Inver, is another example of the same thing.

The fact of the existence of an accumulation, analogous to a delta, and of a bar at the entrance to the Lukuga, is another point for discussion. Ordinary bars are, of course, formed by the water of rivers flowing into a lake or sea, meeting the opposing force of the waves. But the accumulations at the entrance of an outlet from a lake might, perhaps, have a different origin. At the season when the streams flowing into the lake bring down most grass, and when the outlet causes a set towards itself from the greatest distance, then the outlet would draw in the largest quantity of floating matter. When the waters of the lake subside, much of this accumulation would remain in the bay round the outlet, and give rise to the formation of such a morass as is described by Cameron. The authority whom I have already quoted mentions that the Amazon valley channels often get thus choked up in the season of floods. The sill or bar would be caused by the existence of a band of hard clay or rock.

There is the further evidence of the Lukuga being a permanent outlet in the fact that, while there are steep cliffs and mountains round almost every other part of the lake, here the mountains sink down into a plain, on the north side very abruptly, and there is no high land visible in the distance in the direction of the Lukuga's apparent course. On the other hand, it may be that the outflow only takes place during a portion of the year. Instances are not infrequent of lakes which formerly had outlets, from which the water has ceased to flow, owing to the level having sunk in consequence of the lake receiving a much smaller quantity of water than formerly. There are also lakes whose outlets were once rivers, but are now mere swamps, such as Lake Balaton in Hungary. Tanganyika may possibly be another instance. All these are subjects for discussion.

But the question whether Lukuga is a permanent or an intermittent outlet, can in no way affect the credit of its discovery. Lieutenant Cameron was himself doubtful on the subject, and is by no means committed to any theory. He has made a careful survey of the previously unexamined portion of the lake, and found 96 rivers flowing in, besides torrents and springs, and one, the Lukuga, flowing out. And he sends home his results, which he has zealously and carefully collected.

Those results are by no means confined to the geographical discoveries which have now been briefly submitted to you. His ethnological materials are also valuable, and his journal is full of notes descriptive of the people he encountered, of their personal appearance, dress, ornaments and habits, arms, agricultural implements, method of spinning cotton and making pottery, and of their huts and granaries.

He also made an extensive botanical collection, which unfortunately got wet on the way down to the coast. However, it has been submitted to Dr. Hooker, the President of the Royal Society, who finds that 101 specimens are fit for preservation, of which about a dozen are clearly new to science. These are all in a state which will admit of their being so described that they can be identified. About 35 were common African plants, and as such identifiable as they lay, and the names were catalogued. Dr. Hooker intends to send a notice of the collection to the Linnean Society for publication; and he has expressed surprise that Cameron could have done so much. "Had the collection escaped soaking," he adds, "it would have been a very fine one: as it is, it is very interesting, independently of the *flora* to which it belongs being otherwise utterly unknown."

Lieutenant Cameron has also sent home a small geological collection, which has been placed in the hands of Mr. Prestwich.

As regards our explorer's strictly geographical work, it may be summed up as follows:—

1st. He has discovered and explored two of the chief southern tributaries of the Malagarazi, and the chain of mountains on the right bank of the Sindy.

2nd. He has finally fixed the height of Lake Tanganyika above the sea, by observation of the mercurial barometer.

3rd. He has explored and made a careful compass survey, checked by meridian altitudes, of 560 miles of coast-line round the southern half of Lake Tanganyika.

4th. He has discovered the drain which connects the Likwa with the Tanganyika, and has fixed its position.

5th. He has discovered the outlet to Lake Tanganyika.

Lieutenant Cameron has thus done most valuable and distinguished service to geographical science, and the results are in your hands. In my opinion, he has proved himself to be an able, a diligent, and a careful explorer; undaunted by dangers, not to be deterred by illness or hardships, and admirably adapted, by his tact and kindliness, for the management of natives. I hope for your concurrence in this view. He has already rendered good service. He is now gallantly attempting to achieve one of the most hazardous and difficult exploits ever undertaken by an English traveller. That he may succeed, and that he may be restored to his country and his friends, must, I think, be the sincere and hearty wish of every geographer.

Sir BARTLE FRERE said all the Fellows of the Royal Geographical Society might feel proud of the young officer to whom they had entrusted so great a charge, and quite satisfied with what he had already done. It was worthy of note how closely he had complied with the instructions which were given to him. He was told to do all he could to complete and extend Dr. Livingstone's discoveries; and, instead of starting off upon any new Will-o'-the-wisp of his own, he had steadily set himself to work to fill up the gaps in the work of his great predecessor. If he carried out what he had now undertaken, namely, the following up of the apparent outlet of the lake, whether he ultimately reached Colonel Gordon by way of Albert Nyanza, or the Portuguese possessions on the West Coast, he would do a work which had very few parallels even in the great discoveries of African travellers. The Society might now hope, any day, to hear what he had been doing during the twelve months which had elapsed since his voyage around the southern half of Tanganyika. Mr. Markham had not in the least overstated the importance of his discoveries so far. Captain Burton had inclined to the opinion that this great lake was a volcanic depression; and no one who looked at its outline, as now for the first time presented, could fail to be struck by its extraordinary resemblance to the great American cañons, or the great rifts which Livingstone discovered further south. It seemed as if, in the raising of the continent, the upper strata had been torn asunder, and the edges left some 15 or 20 miles apart. The character of the sides, with the exception of the one apparent outlet, favoured that supposition; and he asked the members to recollect what Sir Frederick Goldsmid and his companions had stated with regard to those valleys in Mekran and Southern Persia, where a river after entering a valley, running at right angles across its previous course, flowed a short distance along in its new direction, and found an outlet very much in the same direction as its original course. If they supposed one of those great valleys in Mekran or Southern Persia uplifted on its seaward side, it would produce just such a lake as Tanganyika, with perhaps an outlet over a depression towards the sea. This view might or might not be confirmed by further observation, but it was very curious that the facts ascertained by Lieut. Cameron so far bore out what Captain Burton only suspected. Hardly sufficient weight had, he thought, been given to the possible effects of the continuous monsoon wind acting upon a long trough of such a character as Tanganyika. The great American engineer, Mr. Ellett, in his work on the Missisippi and Missouri, calculated the amount of elevation which might be given to the water in a reach of a river 5 or 6 miles in length, by a continuous wind, and estimated it at as much as 8 inches on some of the reaches of the Missouri. Those reaches, of course, were very short when compared with the length of an immense trough like Tanganyika; and a monsoon, blowing almost directly either up or down such a trough, would produce such an elevation at either end as to reconcile the apparently contradictory statements of people who had observed it at different times of the year. Only a few months ago Sir Samuel Baker, at one of the meetings of the Society, stated his belief, founded on what the Arabs had told him, that occasionally, if not annually, there was a communication between the north of Tanganyika and the Albert Nyanza; and Mr. Major had more than once said that he could not help thinking that there might have been some foundation for the statements of old geographers 200 years ago, apparently on the evidence of the Arab and Negro traders of that day, that there was such a communication by a low morass, not always covered with water, but at times giving access from Tanganyika to the great lakes to the north. The facts stated by Lieut. Cameron would, at any rate, enable geographers to suspend their judgment as to the theories of the old Portuguese discoverers, and prevent their being too dogmatic on the subject; for it was evident that, even without supposing any great variation in the rainfall, there might be a great difference in the height of the lake at the two ends at different times of the year. Mr. Markham had called attention to the various bars at the mouths of the rivers; but they must not be too sure that those bars either proved or disproved an inlet or an outlet, because all naval officers and harbour engineers would agree that a bar formed wherever there was a change in the direction or in the rate of progress of water laden with sand and silt. If, during the prevalence of the wind, which had such an effect that the surf beat up the sand in the shallow waters near the coast, and carried it in a semi-suspended state along the bottom, the flow came to an outlet such as that in which Lieut. Cameron had sheltered in still water, the sand would be deposited and a bar would be formed, whether the water was flowing out or in. Here again was another reason for suspending judgment until further information was received, as the bar might imply either an inlet or an outlet. The facts that had been mentioned with regard to the heavy drift-wood were very much in favour of a great outlet, and the conditions appeared to be very similar to those described by Sir Samuel Baker and Colonel Gordon as existing on the northern outlets of the Albert Nyanza. All these things showed how much yet remained to be ascertained before it could be said with certainty that the true theory of the Tanganyika had been ascertained; but there could be no doubt as to the great amount of information which had been obtained by Lieut. Cameron, who well deserved all the praise which had been given to him.

Colonel GRANT stated that the western shores of the Victoria Nyanza were very different from those of the southern half of the Tanganyika as described by Lieut. Cameron. The shores of the latter lake seemed to be abrupt and rocky, while those on the western side of the Victoria Nyanza were flat, with hills declining gradually to the lake. The floating bridges which Lieut. Cameron had described were seen while crossing swamps near the Equator. They could scarcely, however, be called bridges, as they only partially support the body and must be waded through. They are extensive swamps choked with submerged grass. In Karagwe he had found an antelope whose feet were so formed as to enable it to walk upon this floating grass. Its hoofs were widely forked and remarkably long, allowing it to support itself on the grass while crossing and feeding in those swamps.

The Rev. HORACE WALLER said that some two months ago he had, on behalf of Dr. Livingstone's family, received from the Foreign Office a map and fourteen pocket-books, which Lieut. Cameron had found at Ujiji among Dr. Livingstone's effects, and forwarded to England. He wished to express his cordial thanks for the map, which was a missing section of Livingstone's work and of much importance. The pocket-books were, of course, in a great measure duplicates of the Journal which had been published. To make doubly sure, and fearing, perhaps, that Mr. Stanley might meet with some accident, Dr. Livingstone had left these pocket-books at Ujiji, as well as some seeds and geological specimens which Lieut. Cameron had sent home. With regard to Lieutenant Cameron's survey, it was now established beyond doubt that Tanganyika was 2710 feet above the sea. Lake Moero, more to the south, was 3546 feet, and it was difficult to understand how the Lukuga, if its course was to the south-west, could get over that difference of elevation. Nyangwé, however, which was far to the north on the Lualaba, was stated by Livingstone to be about 2000 feet; so that there was a very considerable fall in that direction, and, without expressing an opinion as to whether or not the Lukuga was the actual outlet of the lake, he would rather suggest that it took a turn to the north instead of to the south. Dr. Livingstone believed that there was an outlet somewhere in that direction. The lake shore for some distance to the north of the Kasenge islands had not yet been explored, and it was just there that Dr. Livingstone supposed the outlet might be found. Whether this view was correct or not, he could not accept the theory that the Lukuga was a perpetual outlet from the Tanganyika, and Lieutenant Cameron by no means pressed his opinion so far as that. On the opposite side there was a large lagoon, and, as it became empty in the dry season by the evaporation of the water, there must inevitably be a flow and reflow in the channel which led to it. He suggested that there might be something of the same kind on the west coast, and that the Lukuga might possibly flow inland and form a lagoon. Dr. Livingstone was at one time within 5 or 6 miles of the Lukuga, and stayed for two or three days in the vicinity; and it seemed very extraordinary that he did not hear of the outlet if it really was there. He could only hope that Lieutenant Cameron might be spared to continue his examination of Tanganyika in that portion which had not yet been explored. Probably, in talking the matter over with the Arabs, they would explain that they did not mean that they could go by water in a south-west direction to reach Nyangwé, because such a journey would have been quite out of their way. He could not help thinking that the outlet, wherever it broke away from the lake, joined the Lualaba after a north-west course, and not south-west. This, however, was only theory, and, whatever view was taken, injustice must not be done to Lieutenant Cameron by insisting that he had discovered more than he really had.

Mr. **FRANCIS GALTON** asked if Lieutenant Cameron had given any soundings of the lake.

Mr. **CLEMENTS MARKHAM** replied that he had not. The only depths he had given were in the entrance to the Lukuga.

Mr. **FRANCIS GALTON** said that, some twenty years ago, the well-known phenomenon known as the *Sèche*, in Switzerland, attracted considerable attention. When a violent wind was blowing, a difference of level between the two ends, of no less than 2½ feet, might be produced in the little Lake of Geneva. In a lake of such magnitude as Tanganyika, therefore, the difference might be very considerable. All who had watched Lieutenant Cameron's expedition must extremely rejoice that, after all the misfortunes and delays that occurred in the early part of it, it should have been reserved for Lieutenant Cameron to discover what appeared to be the outlet of the lake, and to establish implicitly that the head-waters of the Congo were those of the Malagarazi River. At the same time, we must all sympathise with the disappointment Captain Burton must feel, owing to a singular piece of ill fortune, that his own expedition which discovered the lake was deprived of the further honour of discovering its outlet. We now see that the Lukuga lies on the western shores of the lake, just beyond the most southern station that his companion, Captain Speke, visited, and such has been the course of successive explorations that the entire lake has had to be circumnavigated before the Lukuga could be found, situated as it is just behind what may be considered the starting-point of the circumnavigation.

Dr. **BADGER** said that Lieutenant Cameron had called upon him before he set out upon his expedition, and asked him regarding the best way of getting on with the Arabs. The advice which he (Dr. Badger) gave was: "Keep your temper." At Zanzibar he inquired frequently of the Arabs what they thought of Cameron, and the reply invariably was that he was the most kindly-dispositioned and generous man they had ever met with. Later reports, received from the most trustworthy sources, had confirmed this opinion of Cameron's popularity with the Arabs in Eastern Africa.

The **PRESIDENT** remarked that Lieutenant Cameron himself had never put forward a positive claim to having discovered the outlet of Tanganyika. In his journal he gave the *pros* and *cons* with the most perfect sincerity and impartiality. He would willingly have convinced himself that the Lukuga was the outlet, but he constantly heard adverse rumours, and in the journal which had been sent home he really left the question doubtful. By the last accounts, he was proceeding to satisfy himself whether it really was an outlet into the Lualaba, or merely into some lagoon which interposed between Tanganyika and the Lualaba. He (the President) could hardly admit the possibility of the existence of an outlet running, as Mr. Waller had suggested, in a north-west direction; because, if such had been the case, Dr. Livingstone would have crossed it in passing from Tanganyika to Manyuema. He not only did not cross any such effluent, but he never heard of it; and he was, consequently, led to suppose that if the outlet was on the west coast, it must be to the south of the point at which he left the lake, *i.e.* at Kasenge. The only place south of Kasenge where such an outlet could be, was just where Lieutenant Cameron had found the Lukuga, where the coast was depressed, and where there was apparently a natural opening in a south-west direction, leading, as the Arabs said, to the Lualaba, between the lakes Moero and Kamolondo. The natives, too, told Lieutenant Cameron that they passed by that outlet, *i. e.* along the banks, to the Lualaba and Nyangwe. It was, however, still a doubtful point, and could not be settled until further information was received from Lieutenant Cameron. It could hardly be expected that he had followed the west shore of the lake from Kasenge to the north; for by the last accounts his intention was to proceed to Manyuema, and thence to follow the Lualaba to its outlet—whether north to the Albert Nyanza, or west to the West Coast of Africa. It was now ten months since he started on his journey from Ujiji, and if he had found that the Lualaba was the Congo, he ought by this time to have reached the Yellala Falls. At any moment, therefore, definite intelligence of his whereabouts might be expected. It was satisfactory to know that both the Foreign Office and the Admiralty had sent out instructions to all the naval and consular officers on the West Coast of Africa to look out for him, and to endeavour to obtain news of him from the traders who came to the coast from the interior. If they met him they were directed to give him every possible assistance, and to send him with all speed and despatch to his native land.

Ninth Meeting, 22*nd March*, 1875.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*J. S. Noldwritt, Esq.; William F. Schäfer, Esq.; J. W. Goodinge, Esq.*

ELECTIONS.—*Henry M'L. Backler, Esq.; Edward Fras. Beesly, Esq.; John Duncan, Esq.; John Ferguson, Esq.; Admiral the Hon. Sir F. W. Grey,* G.C.B.; *Edwin Hodder, Esq.; Walter F. Hooper, Esq.; Richard Jeffs, Esq.; Samuel Jennings, jun., Esq.; Robert Edwin Lyne, Esq.; Edward E. Meakin, Esq.; Robert Nicholson, Esq.; Thomas Clark Sharp,* LL.D.; *Joseph Alfred Skertchly, Esq.; James Weeks Szlumper, Esq.; Arthur White, Esq.; Clement L. Wragge, Esq.*

DONATIONS TO THE LIBRARY FROM 8TH TO 22ND MARCH, 1875.—Notes on the lost river of the Indian Desert; by C. F. Oldham, 1874 (*Author*). The armed strength of Sweden and Norway; by Captain W. S. Cooke, 1874 (*The Topographical Department.*) Oriental Zigzag; by Charles Hamilton, 1875 (*Messrs. Chapman and Hall*). Arizona; by C. D. Poston (*Author*). Journal of the Shanghai Literary and Scientific Society, No. 2, 1858 (*Dr. S. W. Bushell*). Report of Proceedings of Conference of Maritime Meteorology, 1874 (*The Meteorological Committee*). Reproduction in photolithography of letter from Godinho de Oredia (*The Secretary of the Portuguese Legation*). Italy: Handbook for Travellers; by K. Baedeker, 3rd part, 1875 (*Editor*). Results of Observations made at the Radcliffe Observatory in 1872, vol. xxxii. (*The Radcliffe Trustees*). J. B. Biot's Tafeln neu berechnet von H. Kiefer, and Inhaltsverzeichniss zum Bibliotheks Katalog des Tiflisschen physikalischen Observatoriums, von H. Kiefer, 1874 (*The Tiflis Observatory*). Discursos, &c., del Señor Don Francisco Coello y Quesada, 1874, and Noticias sobre las vías, &c., de la epoca romana en la Provincia de Álava; por F. Coello y Quesada, 1874 (*Señor Quesada*). Météorologie nautique, No. 532 (*Dépôt des cartes et plans de la Marine*); and the current issues of corresponding Socities, &c.

DONATIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF MARCH 8TH, 1875.—Season chart of the World, with the differences of Time East and West of Greenwich, and the approximate monthly rainfall of either hemisphere, showing also the Chief Ports and Routes of Commerce throughout the Globe. Map of Australia and New Zealand, with the Fiji Islands. The British Colonies and adjacent territories in South Africa (*S. W. Silver, Esq.*). A map of the North-eastern Frontiers of Persia, embracing also Khiva and the intervening Deserts. Published for the 'Journal of the Royal United Service Institution' (*Council of the Royal United Service Institution*). Hypsometrical map of the Oberlechthaler Alps, Rhatikon Chain, and Silvretta Group. Map of the Central part of the system of the Thian-shan Mountains. Map of the highest region of the Himalaya Mountains. Map of the Argentine Republic, Chile, Uruguay, and Paraguay. Kerguelen Island (*Dr. A. Petermann*).

The following paper was read by the author:—

Trade Routes between British Burmah and Western China. By J. CORYTON.

EVER since the opening of the Canal at Suez the question of a direct road from the Bay of Bengal to Western China has been receiving increased attention. The revolution achieved by the use of steam, now in general use in Eastern waters, has rendered us impatient of delay in travel; the merchants of India and Indo-China declare their ports to be suitable emporia for China trade, and merchants at home listen willingly to any schemes by which the dangers of the China seas are to be eliminated from their calculations. Although the subject in this form has but recently attracted the attention of the public at home, the Government of India has, for the last half century, omitted no opportunity of gaining an insight, through actual inspection by competent officers, into the disposition and resources of neighbouring States, and the facilities afforded by the formation of the country for the establishment of routes which should "tap" Western China.

In the absence of regular surveys of the country it is proposed to cross, we must still rely on history for our conviction that no obstacles arising out of the physical conformation of the country exist. For five centuries, if we can credit the Chronicles of Ava, trade was maintained between Burmah and China by way of Bhamo, and enormous armies have from time to time swept, in their career of devastation, along the very tracks we are hoping to see traversed by caravans of traders. Our ignorance of the physical character of the broad belt of country we are desirous of traversing is therefore of small moment, and our maps give us, no doubt with sufficient accuracy, the position of the leading mountains, rivers, and towns. It is our ignorance of the political status of the population we have to deal with that constitutes our real hindrance, and has hitherto caused the failure of our attempts. Those who know the care with which official returns are prepared by the Indian Government will understand how utter that ignorance is, when they learn that until last year the form containing the particulars of our political relations with neighbouring States was sent by the Local Government in blank, for the simple reason that the British authorities were unable to say who their neighbours were. An article in to-day's 'Times,' showing how, under one of the ablest administrators of our day, Sir Arthur Phayre, "some 1000 square miles" were excluded from British sovereignty "by some error" in a map compiled by officers of great Indian experience, will do more to suggest the origin and extent of this chaos in our geographical knowledge than anything I could say.

Now it so happened that it was my duty for some years to speak with authority—I will not say with confidence—on this very subject of the geographical boundaries of States adjacent to British Burmah. In the Court of the Recorder of Moulmein, suits were continually before me involving rights to timber felled on the banks of the Salween, far above British jurisdiction. Each party claimed to have acquired his rights by purchase from the Forest Chief. Finding the difficulty in which I was left from all official recognition of neighbouring states embarrassing, I stated a case for the *opinion of the High Court* of Calcutta; and the opinion of that

Court was that I was bound to determine, as a fact, who was sovereign in the locality in which the timber had grown. The result of having to take judicial cognizance, for this purpose, of the petty skirmishes constantly occurring in the forest districts where the rudest state of society prevails, was, as may be supposed, occasionally absurd. In one case, a forest chief, to make his sovereignty (which I think I had declared established) the more unquestionable, sent to Moulmein, and had a hand-stamp manufactured with his titular honours; and this he was in the habit of affixing, after the fashion of a sign-manual, to documents evidencing the purchase of timber felled within his territory. As a rule, it would be difficult to define these petty sovereignities more exactly than by saying that the chiefs admit in every case some sort of allegiance either to China, Burmah, or Siam, and, as was evident from the careful records of the exploration on the Mékong in 1868, not unfrequently to more than one at the same time.

There is one characteristic of the people inhabiting the belt of country we are considering, which tells either in favour of or against our scheme in precise proportion as the country is tranquil or disturbed. I refer to their love of a wandering life, which makes of the Shan an admirable trader when law and order are prevalent, but a very unpleasant neighbour in cases where the country is unquiet. One of the great objects of our Government in Burmah has been to counteract this restless spirit; and in his last Report, the Chief Commissioner of British Burmah notices with satisfaction the fact that the hill-tribes of Northern Aracan had been undisturbed by the raids of trans-frontier tribes during the year, and that the condition of the tribes within our territories had continued to improve, in consequence of the comparative quiet there existing.

"Our relations with the tribes beyond our administrative frontier," the Report says, "improve year by year. The Koons, formerly the most troublesome tribe in our neighbourhood, are now engaged in friendly intercourse and trade with our people. Messengers arrive during June from the Shindoos, who inhabit a tract of land considerably to the north of the Aracan tracts, and they express a desire to enter into friendly relations with the Superintendent. There is, in fact, every reason to think that the principles laid down three years ago for the adminstration of these hill-tracts are proving very successful in their practical results. Our own subjects are devoting themselves to agriculture, and they obtain a ready market for their tobacco, cotton, and garden produce, while we hold out every inducement to the tribes beyond our boundary to abandon their present restless life, and turn to trade and barter."

Mingled with the motley population of Shans, in the belt of country south-west of Yunan, is one element of which we may regard the increase in the neighbourhood of Bhamo and Mandalay with great satisfaction. I refer to the Chinese, who, having left their country as emigrants from the Eastern ports, have gradually established themselves as coolies, cultivators, and traders along the coast of the Malay Peninsula from Singapore to Rangoon, and so up the Irrawaddy to the very spot to which we are hoping their brethren will come overland to meet and trade with them.

To the obstacles arising out of this political chaos existing outside Western China, we may add the utter disruption of society within it, the consequence of Civil war. In 1855 the Province of Yunan rose in rebellion, and sustained its independence under a Mussulman governor until 1873. During the period of this rule, bands of marauders, under petty chiefs, devastated the country on the frontier, and harried the few unfortunate traders that crossed their path to an extent which threatened to annihilate all trade.

If Tali, the citadel capital of Western Yunan, to which almost all the routes converge, be, as has been supposed, the Yachi of Marco Polo, the character and religious belief of its inhabitants have been for centuries in opposition to that of the rest of China. Writing in 1595, he describes them as a mixture of "idolatrous natives, Nestorian Christians, and Turks." During the last few years of Sultan Soliman's independence, Tali was the centre and key of the rebel power. Soon after the outbreak of the rebellion, the Mussulman troops attempted to push their successes southwards, but met with a repulse from the Tsaubwa of Kiang-tong, and retreated, laying waste the towns of Esmok and Yunan Sen. For ten years the rebel power was confined to the northern portion of Yunan. It was at this time, just as fresh exertions were being made to extend it southwards, and we ourselves were prepared to believe that the rule was permanently established, that it suddenly collapsed. Mr. Margary, writing from Talifoo, on the 18th December, announced his entry into that town, with the sanction of the authorities of Imperial China. "I am elated," he writes, "at my success; I have opened Talifoo, and vanquished the dragon which guarded its gates." In a former letter he had given a sad picture of the desolation produced by the long-protracted war.

We come now to the natural features of the country we are to cross. The plateau of Yunan, which is between 5000 and 6000 feet above the sea-level, is intersected by streams which, in their course, acquire the names of the Irrawaddy, the Salween, the Menam, the Mékong, and the Sonkoi. To the north are the huge barriers of "terrific snow-clad mountains" (as they are termed by the only Englishman who has probably ever crossed them), which preclude all ordinary intercourse between China and Thibet.

Having thus noticed the general condition of the country and the people we have to deal with, I will mention, in an order from west to east, the routes that have been attempted or proposed. These routes are very numerous, but may be divided into thirteen groups:—

1. Cooper's project for entering Thibet from the Brahmaputra.
2. From Sudiya on the Brahmaputra to Bhamo.
3. Route from Calcutta to Bhamo viâ Munipoor.
4. Akyab route to Mandalay.
5. The Irrawaddy route to Rangoon.
6. Sprye's route from Rangoon to Kiang Hung.
7. Route through Tonngoo to Rangoon by canal and rail.
8. Various routes starting from Moulmein.
9. The valley of the Menam.
10. The Mékong.
11. The Sonkoi.
12. The Sikiang.
13. The attempts from Shanghae to march directly westward on Talifoo and Bhamo.

First in this order we come upon the track of a very indefatigable labourer in the establishment of trade-routes. In 1870 Mr. T. T. Cooper, who had been struck on a previous visit to Thibet with the opening that country offered to the tea-planters of Assam, determined to proceed by the way of the Brahmaputra to the southern borders of Thibet, at the extreme east of which he hoped to find means of turning south and getting through Tali to Burmah. Passing up the Brahmaputra as far as Debroogur, Mr. Cooper skirted the river among the Mishmee Hills until, prostrated by fever at Puna, he was compelled to retrace his steps and abandon his design.

Other projects have been formed, and attempts actually made, to reach China from Assam by the more southerly routes from Sudiya, on the Brahmaputra. Those desirous of following in detail the steps taken by order of Government for this purpose, will find much that will interest them in a selection of papers regarding the 'Hill Tracts between Assam and Burmah,' printed at the Bengal *Secretariat* Press in 1873. In the year 1826, Messrs. Wilcox and Boulton, starting from Sudiya, passed along the valley of the Nam Lang to the town of Manche, the head-waters of the Irrawaddy. They were unable to reach any point eastward of Manche, and though within twenty miles of the meridian at which the survey of the Jesuit missionaries of Yunan had just terminated, were compelled by the jealous vigilance of the Burmese authorities to return without having been able to traverse the intermediate space. The subsequent researches of these officers, together with those of Captains Bedford and Neufoille, have done much, however, to dispel the mist that had previously rested on that locality.

The route said to be most in favour with the Calcutta merchants is that which it has been proposed to make in a direct line from Dacca through Sylhet and Munipoor to Bhamo. Of all these routes having Calcutta for their base, we may safely say that they are premature, and can only be usefully surveyed when Bhamo, the point for which they all make, has become the end of a road which is clear of obstructions into China.

The same remark applies to Chittagong, which, although favourably situated in other respects, has too little water to play an effective part as a terminal port.

The pretensions of Akyab have been strongly urged, and the Society is indebted this evening to a public-spirited member of the mercantile community of that port for the map before it. Mr. J. O. Hay thus sums up, in a letter recently addressed to the Associated Chambers of Commerce of the United Kingdom, the advantages of his route. That the line from Akyab to Mandalay is the shortest; that Akyab is the finest port in the Bay of Bengal; that the line will pass through a country rich with coal and iron, and producing cotton, tobacco, tea, indigo, &c., in abundance. Admitting the excellence of the port, I fear that for the present, and until the route by way of Rangoon is brought into successful operation, the great range of the Yomadoung Hills, the lowest pass of which is over 4000 feet in height, will cause the consideration and the claims of Akyab to be postponed.

We come next to the Irrawaddy with its ports of Bassein and Rangoon. The adoption of either of these ports is a mere detail in the Bhamo scheme, and I shall consider it therefore with reference to Rangoon. The route by the Irrawaddy follows the course of that river from Rangoon to Bhamo, a distance of between 600 and 700 miles, and passes thence by way of Manwyne and Mômein or Tengyechow to Talifoo. The following extracts from the last Administrative Report issued by the Local Government of Burmah, set out the *reasons for which this route* has been selected for its support.

"Since the suppression of the Panthay rebellion, the commercial intercourse between the province of Yunan and Bhamo is steadily increasing, and the Chinese firms in Rangoon are establishing branches at the last-named mart. The Burmese Government seem inclined to run their steamers between Mandalay and Bhamo; and, indeed, from all sides it is apparent that this route, the traditional western entrance into China, is destined to develope far beyond its condition at any previous point in history. The Rangoon and Irrawaddy State Railway, for the construction of which sanction has been accorded by her Majesty's Secretary of State, comes most opportunely as the most fitting exhibition of the determination of Government fairly to take in hand the thorough establishment of rapid and direct communication between the coast and the great inland markets."

The town of Bhamo, which serves as the starting-point of the route, is on the left bank of the Irrawaddy. If tradition is to be trusted, the place has before now been the scene of busy English trade. From inquiries on the spot, Mr. Bayfield was induced to consider there might be truth in the popular tradition which identifies an old ruin a day's march to the north-east with a factory established by the English somewhere in this neighbourhood, as early as the seventeenth century.

This route, as far as Bhamo, may be said to be all that can be desired. The steamers of the Irrawaddy Flotilla Company make the journey from Rangoon in nine days and return in four. The difficulties of the route consist, as we have learned by experience, in the liability to attack by the tribes bordering on it between Bhamo and Mômein. If Major Sladen, who had good opportunities of judging, is to be relied on, "130 miles of railway between Bhamo and Mômein would effectually tap the resources of Yunan." The direct distance between Bhamo and Mômein is given at 122 miles, so that the railway spoken of, if feasible, could not be said to be one of uncommon deviation. Beyond Mômein we need hardly trouble ourselves with the question of communication, that town being connected with the principal towns of China by paved roads.

The history of the two expeditions we have despatched by this route is well known. Major Sladen's expedition in 1868 was for a long time detained by the hostility of a Kachyen chief in Ponsee, a village 10 miles westward of Manwyne. In Manwyne itself he was hospitably received, and was welcomed by the Mussulman Governor in Mômein, at that time in rebellion against China. From *that point* he retraced his steps, and no further action was taken until the expedition of the present year, organised under Colonel Browne. The history of this expedition, after its starting, is at present but imperfectly known. It was attacked at Manwyne by Chinese and Kachyens. Mr. Margary, a member of it, was killed. The rest of the party returned immediately afterwards to Rangoon.

The next route is that which leaves the Irawaddy at Mandalay, the present capital of Burmah Proper, and passing easterly along the valley of the Myit-gne, goes through Theebo and Theinnee to the Salween, which it crosses at Konglong, thence along the valley of the Nanting to Shunning and Talifoo. It was by this route that Colonel Browne was originally intended to have proceeded on his mission to Talifoo. It is traversed by numbers of traders every year, and being further from the dreaded Kachyens, has the reputation of being safer than either of the routes north or south of it. The eastern bank of the Salween through which this route runs, enjoyed during the existence of the Panthay kingdom an excellent reputation for order. A party of Panthays, who visited Moulmein in 1870, enlarged much on the tranquillity of this route. One of them, in speaking to me of it, threw down his wallet, and said, "There, I would leave it so in any part from Kiangma to Mounting."

Of the Sprye route, from Rangoon to Kiang Hung, no one who reads the records of the Mékong expedition can doubt that its terminal point in China is admirably selected. The obstacles offered by the character of the country are, however, very great. In his report to the Glasgow Chamber of Commerce, Mr. Findlay, who has been a great traveller in Burmah, expresses himself as decidedly adverse to it on the score of difficulties of construction. "I have seen," he says, "something of the country through which this (viz., the railway from Rangoon to Esmok) would have to pass, and can say, with full assurance, that a less promising field for railway enterprise it would be difficult to imagine.

"The line proposed would have to cross four great rivers, the Sittang, the Salween, the Menam, and the Mékong, or Great Cambodia, and no one can say how many tributary streams. Besides this, the valleys of these rivers are separated from each other by numerous ranges of hills which, in some places, might be more properly called mountains—frequently remarkable for their steepness—covered with jungle to their summits and utterly uninhabited, or, if at all, most sparingly so.

"I have no hesitation in saying, from what I have heard and seen of the country in question, that the scheme is in every point of view *impracticable, even if the* valleys were much more thickly inhabited than they are. I would further observe, that if a railway ever enters China from Burmah or Bengal, it will be by following, as far as possible, one of the valleys of the great rivers, and that it is in vain to think of doing so by repudiating the facilities offered by these, and attempting to drive a railway across them in spite of every natural difficulty and obstacle."

I should pass over the Sittang altogether as a trade outlet, were it not for the measures now in contemplation by the Local Government to draw off the very considerable trade of Tongoo on the north-east frontier of British Burmah, by a canal and railway to Rangoon. The river itself can never be utilized for our purpose, since, owing to the peculiar formation of the head of the Gulf of Martaban, it is subject to a tidal bore which renders the Sittang unapproachable from the sea. The tidal creek, moreover, which connects the Pegu River with the Sittang being open only at spring tide, the Shan trader at Tongoo, only 160 miles from Rangoon, finds himself as distant from his market as the Chinaman at Bhamo, which is 700 miles from Rangoon.

I come next to Moulmein on the Salween (or, as it is called in China, the Loo-kiang). This river, as you will see by the map, runs precisely in the direction of the traffic we are desirous of attracting. If the river were navigable throughout, or if its deficiencies could be supplemented by canals, or if a railway could be run along its banks, the question of the best route from Tali to the sea would soon be decided. It is unfortunately navigable only for about 120 miles from the port of Amherst, where the navigation is interrupted by the falls of the Kyodan, the height of which is about 30 feet in the cold weather, the river rising to this level in the rains. Beyond this point but little of this river is known to Europeans. It is marked in the maps as full of rocks and rapids, but these obstacles have been put in mostly from hearsay and by conjecture, since, notwithstanding the despatch of several parties with a view to its exploration, the upper part of the Salween has not been visited by anyone competent to survey it. I have been assured by natives from the neighbourhood of Moné, that it is navigable many days' journey between that town and Dahgwinzeik. The routes of the exploration parties of O'Riley, 1855–6; Barker, 1856–7; Watson, Sconce, and O'Riley, 1863–4; and Watson and Fedden, 1864–5, will be found on the map annexed to the papers relating to M'Leod and Richardson's famous missions, which I shall notice directly.

The notice by the Local Government in its Report of the trade-route leading from the Siamese Provinces on the Upper Cambodia through the tributary state of Zimmay, to the Tenasserim division of British Burmah, runs thus:—"Even from the lower provinces of China, produce finds its way by this route, and it is hoped that the commercial treaty lately entered into between the King of Siam and the Government of India, to develope and regulate the trade passing through Zimmay, may be attended with good results."

I have spoken already of the well-established trade, which it is a matter of history was formerly carried on between China and the ports of Burmah. In the first years of our occupation of the eastern part of what is now British Burmah, it seemed as if all we are now hoping for was actually made to our hands. Caravans of Chinese traders were at Zimmay, waiting only for an assurance of safe-conduct to visit our newly-acquired port. On our part, the authorities at Moulmein were using every exertion to secure, by diplomatic negociations with Siam, the quiet of the district through which the traders had to pass.

A writer in the 'Moulmein Advertiser' says:—"We believe that one of the objects of the mission is to remove the obstacles which appear still to exist to the free passage of the Chinese overland-caravans to Moulmein. This is indeed a most important object, and one that should not be lost sight of. The failure of the attempt to reach Moulmein last year must have tended greatly to discourage all future endeavours, and if, as is supposed, there exists a jealousy of this intercourse on the part of the neighbouring Shan States, it can only be overcome by the presence of a British officer furnished with a royal order for a free and unmolested passage to the Chinese. We can scarce expect, after what has happened, to see the Chinese down this season, but we trust all impediments will be removed from future journeys."

After stating that Dr. Richardson had been selected for the Mission, the writer proceeds:—

"Dr. Richardson is so well known among the Shan States that we feel convinced, should he succeed in reaching them direct from the capital of Siam, furnished with orders for the removal of all impediments to the journey of the Chinese, we shall have them here at the close of the next year in considerable numbers, and it may be eventually that Moulmein will become an emporium for the export of tea. Captain M'Leod found it extensively cultivated between Kyain-Tung and Kyain-Hung, whence it is carried into the Chinese Provinces . . ."

In the interesting 'Papers relating to the route of Captain W. C. M'Leod from Moulmein to the frontiers of China, and the *route of Dr. Richardson* on his fourth Mission to the Shan

Provinces of Burmah,' printed by order of the House of Commons, in 1869, we find records of journeys by the officers of British Burmah, which, neither for extent nor importance of results, have been since ever equalled.

"I found," says Dr. Richardson, describing what he saw at Zimmay, in 1829, "the caravan of Chinese traders consisting of 200 mules and horses. Three hundred more were said to be at Moung-Nan, where cotton is abundant. They had arrived in the country a considerable time before me, and were preparing shortly to return home. I had a good deal of conversation with two heads of caravans, who seemed to be intelligent, enterprising characters. They said they had long entertained the idea of visiting Moulmein, and now that they were invited to do so, and were assured of protection, they would undoubtedly do so next season, the present one being too far advanced to allow of their increasing their distance from home. They requested that an interpreter should meet them at Zimmay; and from their repeated requests that he should be at Zimmay in November, in order to accompany them down, I feel convinced that this people will be at Moulmein before the end of the year."

The disposition of the chiefs through whose territory the caravans would have to pass, Dr. Richardson speaks of as most favourable. "I found," he says, "no difficulty whatever in obtaining their consent to their passing through the country. No objection was ever hinted, nor have I reason to expect that any will hereafter arise."

As to the conditions under which, if we are successful, our first trade in this direction, will probably be carried on, the remarks made by Richardson on the caravans he fell in with on this occasion have much interest for us.

"The imports by these caravans consist of copper and iron vessels, silk (raw and manufactured), stains, gold and silver thread and lace, musk, walnuts, carpets, and vermilion. They export from the Shan country, cotton, ivory, skins, and horns. From the information which I could collect, the caravans assembled at Moung Koo, distant from Zimmay about two months' journey. Their goods are conveyed by mules, and they would appear to travel rapidly, as they asserted they would not be more than twelve days from Zimmay to Moulmein. They allow nothing to detain them on their journeys. If a man fall sick, or is disabled, he is left behind; and if one dies, they do not even stop to bury him, but cover his body with a cloth and continue their route."

The most important of these official journeys, however, so far as our present purpose is concerned, was that of Captain M'Leod, who, crossing the Thong-yeen in December, 1836, actually reached the frontier of China at Kiang-Hung, on the western banks of the Mékong. Beyond this point all attempts to progress were unavailing. He was told, if he insisted upon going on, the subject must be referred to the King through the customary channels, and an answer might be expected in about a year. Though within five marches of China, Captain M'Leod, knowing he would apply to the Court of Pekin in vain, determined on returning to Moulmein, and left Kiang-Hung on the 21st March. His return was far more expeditiously performed than his journey outwards. He reached Kiang-tung on the 31st, and found that orders had arrived from Moné, not to permit him to proceed until instructions had arrived from Ava. Quitting Kiang-tung on the 4th April, he arrived at Zimmay on the 19th. The authorities at Zimmay ultimately refused to permit our merchants to proceed by the road travelled by Captain M'Leod; for such was their hatred of the Burmese that they would hold no communication with them. The Chinese even, who were on terms of amity with both nations, found themselves compelled to travel on the eastern bank of the Mékong, over high mountains, where the territories of Kiang-Hung adjoined those of Moung-Nan, one of the Shan States tributary to Siam.

From Zimmay, which he left on May 11th, M'Leod deviated from his former route, travelling seven days in a southerly direction, which brought him to within two stages of the town of Labong, where he crossed the Mépiu, and, striking off to the westward, reached the Thong-yeen in five days, and Moulmein by six further stages. The road he took, though circuitous, ran generally over low hills, and was in every way preferable to the route by which he had gone up, villages from which supplies were procurable being met with every second or third day. M'Leod describes the tribes, from the North of Zimmay to the frontier of China, as differing in their stages of civilization and in language, having no written character, no ideas of a Supreme Being. The mountains he saw were all thickly wooded, and abounded with wild animals and game of every sort.

The extent of the trade that now actually exists between the seaports of British Burmah and the interior will, I think, surprise those who are not acquainted with the subject by personal inspection. I was assured by Aga Syud, one of the leading native merchants of Moulmein, that the value of the piece-goods, with which our hardy visitors, the Shan pedlars, trudge back to their homes yearly, is not less than a lac (10,000l.), while respectable

Surattee merchants had assured me that it rarely falls below 30,000*l.*, or two-thirds our entire imports of this class. The amount varies, no doubt, within large limits. Under favourable conditions, that is to say, when tranquillity prevails upon our frontiers, it attains considerable dimensions, while disturbances have an equally powerful effect in the opposite direction.

It is extremely difficult to obtain anything like trustworthy statistics with reference to the primitive trade thus carried on, the traders being apprehensive that if their profits were known to the Government, they would be subjected to taxation. The number of Shan residents, both in Rangoon and Moulmein, is very large, augmenting and decreasing in proportion to the tranquillity of the times. The numbers stood for Moulmein as high as 4859 in 1865. Owing to the troubled state of the adjacent territory of Karennee, it fell shortly after to 966.

Thinking it might be of interest, I have brought with me some silk and copper, which were brought into Moulmein, some four years ago, by a party of twenty-eight men, who had journeyed thither for a period of ninety days. I sent some of the silk to Calcutta, and mentioned the price at which it had been sold in the Moulmein bazaar. The quality was unknown in the Calcutta market, but the price was said to be very low. I may mention, as giving some key to the question of price, that the piece of copper before you, which is I believe of greater intrinsic value, was the exchange among these primitive people for an anna (1½*d.*). The hardy habits of the party of traders I am speaking of, were such as, even in a country where great simplicity of life prevails, to excite surprise. They slept during their stay with us in the open air; their large, pear-shaped baskets stacked round in a circle, after the style in which, as they informed us, they bivouacked nightly during their long wanderings. One of the officers of the British India Steamers, who accompanied me to visit them, said he felt confident from their general appearance that they were natives of Tonquin, and this opinion was subsequently confirmed to me at home by Mr. Cooper, who said he was familiar with the kind of silk they brought. As I was known to take much interest in such matters, the arrival of Shan traders that had come from extraordinary distances was usually announced to me by the Burmese; when possible I paid the people a visit, and endeavoured to get what information I could from them as to their routes. On the occasion of the traders I am speaking of coming in, I was called to see "Chopstick Shans," and found that half of them disposed of their food in this fashion, and the other in the manner usual with Burmese. On inquiry, it turned out that the little company was composed of two parties, who had come from different quarters, and met at about a month's march distant from Moulmein. Their routes are shown on a map made by themselves, which I have brought with me this evening.

Speaking of this and other similar maps, I am reminded of a peculiarity of the Shans which has not, I think, hitherto received attention. It is their almost instinctive recognition of time, direction, and distance—the result, no doubt, of a wandering life. The maps exhibited, and which I have much pleasure in presenting to this Society, have almost all been drawn by these pedlars themselves, usually in the verandah of my own house; the only assistance they received being that of the interpreters and lookers-on of their own parties. Those on canvas are copies kindly made for me by the Surveyor-General of India, Colonel Thuillier, in return for the originals, which, together with a set of valuable and elaborate maps which Mr. MacCall, of Todd Findlay's, was good enough to give me soon after my arrival in Moulmein, I had presented to the Government of India.

As an instance of the great distance traversed by Shan traders, I may mention the party of 54 men who were visiting Moulmein at the time that the late Viceroy, Lord Mayo, was making his tour of inspection in 1872. His Lordship spent nearly an hour before embarking in examining these men, who proved to be Panthays, who, starting from Maingshai in China, had reached Moulmein after a journey of 100 days, by way of Thein-nee, Tonngoo, and Martaban. They had traded in silk and gold-thread to Thein-nee, where they bought 100 horses, which they brought on to Moulmein for sale. They had, according to their account, passed through towns of considerable size. One great step will have been taken for the security of the traders, and the accommodation of the trade by this route, when we have bridged the Attaran. The scheme has often been contemplated; and the bridge proposed, as you may see from the accompanying map, is of very modest dimensions.

The next route in order, as we move eastward, is that of the Menam. This river is exceedingly difficult of navigation; and Bangkok, the capital of Siam, its port, has not water enough to satisfy the conditions of a great oversea trade. I shall not stay, therefore, to consider the prospects of this route, but content myself with recording the fact that on the 4th January, 1873, a treaty was concluded between the Government of Siam and the Government of India for the protection of life and property *within the State of* the Chief of Zimmay, through which the traffic of Moulmein from China has to pass. The treaty provides for the repression and punishment of robbers and marauders.

The route next in order eastward—a very promising one, if we judge of it by the map—is that of the Lan San Kiang, or Mékong. The merits of this route were recently tested by an expedition, the most memorable and instructive in the annals of exploration. The exploring party, headed by De Lagrée, the commander of a French gunboat, left Saigon in June, 1866, and after a visit to Pnom-peng, the new capital of Cambodia, began their arduous journey towards China. On the second day after leaving Pnom-peng the navigation became impracticable for the gunboat, and the party had to proceed in canoes. Had the object of this expedition been only to test the navigability of the river, it might have ended its labours here, for the river was full of rocks, dangerous even for canoes. They persevered, however, with the greatest gallantry. Days and weeks went by, as they continued their slow and perilous passage. Provisions began to fail. Several of the party were ill. The guards became mutinous, and, in addition to all this, the floods, against which they had to struggle, were at times so violent that the boatmen found no other means of progress possible except that of clinging to the bank and pulling themselves along by the trees and bushes. "Our hold on the bank once lost," says De Carné, "the boat would be swept away by the current like a straw."

The observations of the writer of the interesting narrative of this exploration are so valuable with reference to the very points we are desirous of determining, that I regret to be unable to give even the shortest summary of them. They include careful notes of the degrees by which the language, character, and political proclivities varied as they went on, until at Ham-gu they arrive at veritable China, find well-constructed bridges, and see women with crumpled toes. Before they reached that spot they had terrible sufferings to encounter, and at times must have almost despaired of their undertaking. At Barsae M. de Carné compares the relations of the potentate of that district with Bangkok to those of the Shan States of Burmah with Mandalay, and comes to the conclusion that the real politics of "the King," as he is called, is to profess allegiance to Siam, and do exactly as he pleases; a description which would suit, more or less accurately, a vast number out of the innumerable tribes scattered over this unknown country. The work is written with patriotic fervour, and records the dismay that came over the party when, wearied with a long day's work, they heard near Vien-Chan that before them was *another* exploring party, and that an English one. The next report announces the party as coming down the river, and the wearied Frenchmen prepare a hospitable welcome. When the "English flotilla" heaves in sight, they find that their laurels are in no danger. It turns out to be the equipage of a Batavo-Dutchman, land-surveyor and architect to his Majesty the King of Siam. Above Paclar, in 18° N. lat., the party passed over the boundary of old Dutch explorations, and found themselves literally in *terra incognita.* The river at this spot, M. de Carné says, takes a bend for nearly 200 miles due west, a direction altogether contrary to that represented on the best maps. At Luang Prabang they discharged the pious office of erecting a monument over the remains of the famous and much lamented traveller Henri Mouhot.

Shortly after leaving Luang Prabang the party had an opportunity of settling a point on which geographers had disagreed. The Menam and the Mékong, namely, were known to approach each other very closely in this region, and it was supposed that they actually coalesced. A point of observation was soon attained from which it was seen that where they were nearest they were separated by a lofty mountain-range, on which a small crater of a volcano was active. At Kiantung the language had undergone a change, but the Laotian interpreter was still able to perform his functions. At a later stage the party had to depend for their communication with the authorities on the written character of the country, with which these Annamite attendants were familiar. This mention of written character reminds me of a circumstance that occurred when, in 1870, a party of Panthays were paying a visit to us at Moulmein. Being asked to write their names, some of them wrote them in Chinese and some in Burmese characters, using the latter not for the same sounds as they represent in Burmah—in fact, with so little resemblance to them as to induce me to believe that they had adopted them arbitrarily. Besides language and physical conformation, there were other than outward signs by which the party were able to gauge the extent of Burmese influence in these regions. At Luang Prabang the travellers noticed the prevalence of the Burmese habit of tatooing from the waist downwards—a practice which procured for the inhabitants of this province from the old Dutch geographers the title of "black-bellied Laos."

At Pales M. de Lagrée was "invited" by a letter from the Tsaubwa to continue his journey through Sien-tong. Neglecting this invitation, which was intended as a command, M. de Lagrée passed on to Samleap, in the State of Muong-You, and here difficulties thickened on him. The rains were at their height, and *carriage transport* was not to be had except at most inordinate rates. The party, however, gallantly struggled on, though each member of it was weakened by fever, dizzy with copious doses of quinine, and faint from the constant bleeding by the leeches, which form so terrible a scourge in Indo-China. Shoeless and ragged, the party arrived at last, across muddy plains and raging torrents, at Samleap.

At Muong-yong M. de Lagrée experienced the consequences of having refused the "invitation" of the Tsaubwa of Kiang-tung. The Governor of Muong-yong declared it impossible that persons guilty of such ill-breeding could be allowed to pass, and M. de Lagrée had to retrace his steps to Kiang-tung, leaving his party at Muong-yong. His reception by the Tsaubwa was polite and courteous. No further obstacles were interposed to the continuance of his journey, and the whole party re-assembled at Muong-yong. Here [they were provided with boats, in which they continued their journey down the Namloi. Crossing a range of hills into the valley of the Nam-ga, they then came next to the town of Muong-tong, in the Kiang-hung State. The party were congratulating themselves on their improved prospects, when a letter arrived from Sien-hong with orders that, if the Europeans arrived, they were to return at once by the way they had come. For this unexpected and apparently arbitrary interruption to their progress it turned out that they were indebted to an excess of zeal for their safety on the part of their own countryman, the Vicar Apostolic of Yunan. Thinking it highly dangerous for them to prosecute their journey, that functionary had addressed a letter to the Viceroy of Yunan and induced that official to send a similar letter to Kiang Hung, and this had been construed by the latter as a prohibition to the party to enter China. The mistake having been explained, the Mékong was crossed for the last time 1200 miles from its mouth, and the precipitous hills which separate the plains of Yunan from the river having been surmounted, the party found themselves, on the 13th of October, 1867, sixteen months after they had left Saigon, in sight of the long-looked-for Esmok in Yunan. The suburbs were in ruins, the result of the civil war then raging. From the accounts which he received here of the state of Upper Yunan, M. de Lagrée judged further advance in the basin of the Mékong (here called the Kiong-lung Kiang, or "River of the Nine Dragons") impracticable. The condition of his party was now almost desperate. Their exchequer was all but empty. They were shoeless and in rags, and the health of all seriously impaired by the privations they had undergone. They had no interpreter, and had to communicate with the authorities through their Annamite attendants, who still understood the written characters though not the language of the country. On leaving the basin of the Mékong the expedition directed its steps towards the Sonkoi, which it struck at the town of Yueng-Kiang. Here better days awaited them. Through Southern Yunan the passport of Prince Kung insured for them everywhere a hospitable reception, and guards and carriage were placed without payment at their disposal. The country is described as fully meriting all the eulogies it has received, and the weary wayfarers declared the scenery reminded them of Provence. The cultivation was everywhere admirable; while pine-forests, and mines of salt, coal, iron, and other metals, gave everywhere tokens of national wealth.

For upwards of a month M. de Lagrée traversed the southern portion of Yunan, visiting the large cities on his way to the provincial capital, Yunan-Sen. The officials everywhere received the party courteously, and the worst they had to suffer was from the intense and inconvenient curiosity of the populace as to the habits and customs of the "foreign devils," who were now for the first time seen in Yunan in their national costume. At Yunan-Sen the party was sumptuously lodged and entertained, and here they had the pleasure of meeting with their own countrymen in the persons of French Jesuit Missionaries of Yunan. The Governor violently opposed M. de Lagrée's project of visiting Talifoo before embarking on the Yangtse for Shanghai. He could not believe that anyone could wish to visit the head-quarters of rebellion without being in league with the rebels. The address of M. de Lagrée triumphed at last over this opposition, and, furnished with a letter from the Grand Mufti of Yunan-Sen to the Sultan of Talifoo, the party started once more on their adventurous journey. The route it was thought best to adopt was a somewhat circuitous one through the southern part of Sze-chuen. They would thus approach Talifoo through a tract which, by the common consent of the rebels and Imperialists, had been left neutral ground, in order that the commerce of the Yangtze-kiang should not be interrupted. The party at length reached the valley of the Yangtse, where they were hospitably received at Tong-tchouen. Here M. de Lagrée became so ill as to be unable to proceed. Leaving one of the doctors with him, the rest of the officers, viz., Messrs. Garnier, Delaporte, Thorel, and De Carné, started on the 30th January, 1868, for Talifoo. Their way was through Hweli, from which town they advanced boldly into the rebel states under the guidance of a Chinese Catholic priest, Père Lu, who conversed with them in Latin, but a Latin, as De *Carné cannot help saying, (à faire frémir,)* "enough to make your flesh creep." The bands of robbers against whom they had been warned were not to be seen. At every place where Mussulman authority prevailed the letter of the Grand Mufti of Yunan-Sen procured them a cordial reception. At Pien-ho their progress was further assisted by another Chinese Catholic priest, whose Latin is declared to have been "absolutely unintelligible." In the same neighbourhood, however, they found a third (a French) Catholic priest who was most useful to them. Father Leguilcher had been living in complete retirement, concealing his whereabouts as much as possible from the Mussulman authorities, whom he described as sanguinary and cruel tyrants, who, during the last ten years, had reduced the population of Yunan by one-half. At the sight of his countrymen he courageously resolved to emerge from his retreat and accompany them to Tali as their interpreter. The party had now to lament the absence of their politic leader, whose admirable tact and *savoir faire* had carried them safely through so many perils. An unfortunate fracas in the streets of Talifoo brought their stay to an end. They had to retrace their steps to Hweli-chouen without exploring the city or the magnificent valley on which it is situated. To the French, therefore, belong the honours of having been the first to reach the goal we have all along been aiming at.

The expedition returning to Tong-chuen found that their gallant leader had succumbed to a disorder produced by the toils and exposure he had undergone in the course of his long and painful journey, and the party descending the Yangtze-kiang, arrived with his remains, after an absence of two years, at Saigon.

The merits of the Sonkoi, which forms the next route, had, as we have seen, attracted the attention of De Lagrée on his journey of exploration of the Mékong, and it is to this river that the French have since the date of that exploration been chiefly directing their attention. M. de Carné speaks of the capabilities of this river-route in the highest terms. The Civil war in Yunan, he says, "has in effect obstructed the ancient channel through which the products of Yunan flowed into the valley of the Irrawaddy, and opposes new obstacles to the re-opening of that road between China and India which is being sought for by the English with more obstinacy than good fortune. When one reflects that what is now required is to direct towards a French possession the products of that vast region, which, without including northern Laos, embraces four of the richest provinces of China, and to open out to us markets where the consumers are counted by millions, it must be *admitted* that a war of conquest and the opening of Tonquin is a necessary result of our establishing ourselves in the six provinces of Lower Cochin China."

The remarks of M. de Carné are endorsed in a very admirable article contributed by another traveller, Herr von Richthofen, to 'The Geographical Magazine' of January, 1874. In an admirably concise and lucid *resumé* of the whole question of trade-routes into South-western China, that gentlemen decides unhesitatingly in favour of the Sonkoi, with Mang-hau as the depôt on its head-waters.

On the 25th of October, 1872, the expedition of the Sonkoi started from Hong Kong under the command of M. Dupuis, a merchant of Hankow, and M. Millot, a merchant of Shanghai. It consisted of two French gunboats and a steam launch, freighted by the Titai Mah of Yunan with the materials of war. The expedition arrived off the mouth of the Sonkoi on the 9th of November, and moved up the river to Kechs or Hannoi, the capital of Tonquin, where it arrived on the 22nd of December, 1872. Tonquin was found to be in a state of political confusion, for the settlement of which M. Dupuis' good offices were put in requisition, and peace eventually restored. M. Dupuis left Hannoi on the 18th of January, and reached Laou Kai, the last city in Tonquin, on the 20th of February. The Hong Kong papers, which reported the progress of the expedition, state that during the whole time the expedition was in Tonquin the Europeans experienced the best reception from the population, "who have the greatest desire to see the foreigners arrive to open their country and relieve them from the oppression" of the mandarins, who are regarded "with the bitterest contempt, and the deepest hatred."

Eastward again of all these routes is that by the valley of the Sikiang, with its seaport of Canton. This, as a saving of time or avoidance of perilous navigation, we need hardly consider.

With Shanghai we close the list of the ports of South-Eastern Asia in any way suited for the reception of the produce of South-Western China. From this busy centre of commerce the attempts have not been few to ascend the Yang-tse in its upper branches, and add to our knowledge of the country in that direction. I have time only to speak of two. Of him that has done the most, who has actually performed the feat, while others were nerving themselves for the attempt or recovering from the discouragement of failure, I say the least. Mr. Margary, attended only by his servants, left Shanghai last September and reached Bhamo in January of the present year. I will not attempt the panegyric or the lament of this accomplished traveller, in whom tenacity of purpose seems to have been so happily blended with affability of manners as to conciliate a notoriously suspicious and jealous population, and render his journey (with exceptions that only gave the zest of variety to his enjoyment—to use his own words)—a "triumphal progress." I have read in the papers many eloquent tributes to the memory of Mr. Margary; but I hardly know whether any have impressed me as conveying the sentiment we should entertain on such an occasion as forcibly as the simple remark of the Secretary of this Society, Mr. Major, when I informed him of the sad occurrence, "He has left us a noble legacy in his example."

The last traveller I shall mention is the gentleman whose exertions at the opposite point of the compass first engaged our attention, Mr. T. T. Cooper. Leaving Shanghai in 1868, Mr. Cooper on arriving at Ching-tu, the capital of Sze-chuen, assumed the native dress for the purpose of avoiding observation, and struck into the only route now in use out of the three formerly travelled from China into Mongolia, terminating at Lhassa, the capital of Thibet. His course was by way of Ta-tsian-too and Batang Atensee and Weeseefoo. At the latter place he was imprisoned, and on his release returned to Shanghai, whence he started for Calcutta on his tour I have already described.

While at Tai-tsian Loo, Mr. Cooper, writing to the editor of the 'North China Daily News,' thus expressed himself as to the project in which Bhamo is considered the natural outlet for trade from the districts of the Upper Yang-tse. "The present trade," he observes, "between Chunking and Yunan and Kweichau is only temporary on account of the closure of the Bhamo and Tah route, and as sure as this route is opened so surely will Burmah take to herself the trade of these two provinces; and if, as is probable, British merchants establish themselves at Ava, a rivalship for the trade of Sze-chuen between China and Burmah seems almost certain, the result telling probably in favour of the latter both in exports and imports. Trade by this route has flourished before without European enterprise, and as soon as it is re-opened the trade between Hankow and Chunking will be lessened one-third."

One can hardly conclude the subject without noticing, in a few words, the grandest of all the schemes for a direct route, viz., railroads such as Sir Macdonald Stephenson and others have proposed, either directly across Yunan by Talifoo or following the route proposed to himself by Captain Blakiston in his gallant attempt to reach Thibet in 1860, viz., by leaving the Yang-tse at the point at which it ceases to be navigable, and taking a course as nearly *west as the* nature of the country would admit of, by Likiang in

Northern Yunan to Sudiya on the Brahmaputra. The missionaries report a very superior coal-formation as covering in little disturbed positions the northern half of Yunan, and spreading probably through the extent of the plateau of that province to its southern descent on the Sonkoi, on which M. Dupuis has reported the discovery of coal.

I have now stated, to the best of my ability, the nature of the various routes, the incidents connected with their exploration, and the various opinions entertained of their merits. I shall be happy if the observations I have made have simplified the subject for those who are interested in geographical inquiry, and happier still, if they should be the means of inducing men of influence to visit Burmah. If any should find themselves so disposed, I would recommend them to visit the provinces in November and keep a watch on the Attaran. It will need only a morning's drive from Moulmein town to bring them face to face at the ferry of Nyoung-ben-zeik with troops of hardy Shan pedlars by whom Kong-long, Shunning, Kiengma, Moungting, and Tali, have in all probability been visited within the year. Seeing them, it is difficult not to look forward hopefully to the time when the petty rill of commerce, now filtering through every obstacle that a disorganised and lawless country can present, will by the restoration of order swell into a broad stream of international trade.

As will be readily understood, the task of compressing within the limits of a short paper a subject so widespreading as trade-routes from Western China has been no easy one, and I would ask your indulgence on this ground for the necessary incompleteness of the paper I have written on it.

The PRESIDENT, in inviting a discussion on the subject of the paper, said the Geographical Society had always taken great interest in the subject of the routes between Burmah and China, and had done its best to awaken a similar interest in the public. Such an interest he thought did exist, but the whole question was still very far from being well understood.

Mr. T. T. COOPER said that from Burmah to China *viâ* Bhamo, the trader has to cross three large watersheds, those of the Salween and the Cambodia. The country is extremely mountainous, and but sparsely inhabited by semi-barbarous tribes, who have not a very keen appreciation of the blessings of civilisation following on trade, but are nevertheless somewhat given to a little peddling. Mr. Coryton had omitted one point of great importance in dealing with the question of the trade-routes. To warrant any expectation of a large trade, a numerous population is necessary; but although the province of Yunan is undoubtedly rich in minerals, the soil fertile, and the people industrious, internecine warfare has so diminished their numbers, that at the present time grass and ruins may be said to cover the luxuriant soil of the country. Hereafter, when the great vitality, which is characteristic of the Chinese, shall have had time to assert itself, and emigrations shall have taken place from the north-eastern provinces to the more fertile west, trade may be expected to arise between Burmah and Yunan. He did not, however, believe that this would happen during the present generation. The geography of the country between Manwyne and Bhamo is very interesting. The mighty rivers which flow through the wall-like mountains, and the hills which afford a habitation to the semi-barbarous tribes, are very beautiful. The flora of those hills is purely tropical, the bamboo being most conspicuous. In the higher altitudes, however, many English shrubs and trees are found, such as the gooseberry, the strawberry, and the oak. The fauna is peculiar to those hills. There are animals there which are to be found in no other part of the world, the most conspicuous being the Takin, belonging to the deer family, and the Mhitton, a sort of wild cattle, somewhat resembling a cross between the buffalo and the bull. Mr. Coryton, most likely inadvertently, referred to the Shans as a barbarous people; but they have a literature probably as ancient as that of the Chinese themselves. They were the people who first forged the link of trade between China and Burmah. They, however, were to blame for having introduced the poppy from Burmah into China. Until they introduced it to the Chinese merchants who visited Yunan annually, poppy cultivation and consumption was unknown in the west of China.

Sir **GEORGE CAMPBELL** said the country had sustained a great misfortune in the loss of that enterprising and excellent young man, Mr. Margary, while he himself had publicly to deplore the death of Lieut. Holcombe, who had fallen, with eighty other British subjects, whilst engaged in the exploration of the country between Assam and Burmah. As Mr. Coryton had said, the routes from Assam to Burmah were of only secondary interest until free communication was established between Bhamo and China. What Mr. Cooper had said of the depopulated state of Yunan, showed how advisable it was to direct attention at present chiefly to the more northerly route, by which direct communication might be obtained with the large and important province of Sze-chuen by way of Batang. The late Duffla Expedition had obtained considerable information with regard to the hill-country to the north of Assam, but the tribes there were very barbarous. The route by the Mishmee country was so far well known, that only political obstacles now intervened to prevent direct communication between Assam and Batang, and through Batang with China. Of late years a very much greater intimacy than formerly existed, had sprung up between the English and the frontier tribes, and the Mishmees had become amenable to British authority to a great extent, so that there would be no serious difficulty to encounter in sending travellers through their country, if the Chinese would only let them pass on the other side. The policy of the Chinese was that of exclusion; but if through the influence of the British Resident at Pekin, or in any other way, permission could be obtained from the Chinese for travellers to enter by the Mishmee route, a communication could be established with the province of Sze-chuen.

Sir **RUTHERFORD ALCOCK** thought there were many cases in which it was impossible to separate geographical from political considerations, and the question of a trade-route between India and China was just such a case. Sir George Campbell had justly said that, as regards access to the richest and wealthiest part of China, Sze-chuen, through the Mishmee country, the difficulties presented by the physical character of the country were as nothing compared with those caused by the exclusive policy of the Chinese, and their determination, so far as England was concerned, to prevent entry into their country except by the seaboard. There could be no doubt that, quite consistently with international rights and law, England could say to the Chinese Government, "We have a treaty of amity and commerce with you, by which we have free access to the interior of your country from the seaboard; and it is an act of hostility on your part to peremptorily forbid us access from every other direction." This was a ground of complaint which might be very fairly taken whenever *Her Majesty's* Government thought the time was come to press their rights.

The late tragic incident only showed with greater certainty, if such proof were needed, that both on the part of Burmah and of China there was a decidedly hostile animus, and a determination *per fas aut nefas*, by force or diplomacy, to prevent England from gaining any fresh access into the interior of China, or opening any trade-routes in that direction. Mr. Margary was personally known to him (Sir R. Alcock), and there was no more promising officer in the Consular service. Everyone who knew him must lament that he should have fallen in what was a perfectly hopeless effort, under present circumstances, to penetrate through the hill-tribes occupying the border lands between Burmah and China. Those tribes recognised the authority of China, Burmah, or Siam, whenever they were in danger of punishment, but at other times they were independent of all control; and it would be as difficult to hold Pekin responsible for anything they did, as to show that Burmah had any direct action in the unfortunate events that had taken place. During the last twenty years a great deal had been said about the importance of opening trade-routes between Burmah and China; but the tragic incidents which had occurred showed that the British Government, as an Asiatic power, should be very careful how they entered upon such expeditions. In other countries it might be advisable to risk valuable lives for an adequate object, if failure merely meant the failure of that particular enterprise; but England could not afford to risk a failure among Asiatics. Our empire there was an empire of prestige, and it was absolutely essential that we should not accept defeat, or permit a rebuff. He could therefore well understand the reticence that had been shown by successive Governments in India on these matters. If the merchants and pamphleteers who were so eager to urge on the Government to these risky explorations, would regard the difficulties in the proper light, they would not be so ready always to blame those who hesitated before undertaking such expeditions.

The President agreed in the main with Sir Rutherford Alcock's remarks, but not entirely. England must risk something, and, on the whole, both from feeling and experience, he would rather be over-risky than over-cautious. No doubt there were serious considerations to be taken into account, and it behoved a Government to feel its way as much as possible; but he could not feel at all dispirited or discouraged by what had taken place recently. No doubt the loss of Mr. Margary was a very melancholy affair; but the Chinese Government had accepted the mission, and given every facility in their power for its passage through the country. Mr. Margary had actually passed through the length and breadth of China by the very same route which the mission was to follow subsequently. Some of his letters written by him after his arrival at Bhamo had already been published in 'The Times,' and in the last letter, dated January 17th, after he had apparently passed through all his dangers, and had joined Colonel Brown's party at Bhamo, he expressed the greatest joy at the happy result of his journey. It was very sad to reflect that within a week of that time he was no more, and everyone must sympathise with his bereaved family, and deplore the irreparable loss which not only they, but the public service had sustained. With regard to the trade-routes, although those to the east might be the easiest available for commerce, still they could never compete with those to the west, because these latter avoid all the dangers of the Chinese seas to which the eastern routes are exposed. At present the French had two routes at their disposal, one from the north of Tonquin up the Songka River, and the other from Saigon up the Cambodia River; but after arriving at the embouchure of either of those rivers, the trade would have to encounter the danger of the Chinese seas. The essential object must be to start from the Bay of Bengal, and therefore the great question was whether the route should be by the Irrawady or the *Salween. Mr. Coryton had* stated that the Salween is not navigable; consequently, until a railroad was formed in that direction, that route was out of the question. At present the Irrawaddy, however, could be ascended by steamboats without any difficulty as far as Bhamo, and from there to Mômein, the key of Yunan, the distance was only 120 miles. Major Sladen calculated that it could not be more than 130 miles by a circuitous railway. That route accordingly appeared to be the most practicable; but, on the other hand, the tribes inhabiting the Kachyen Hills were exceedingly troublesome and difficult to manage. Major Sladen had sufficient experience of them formerly, and probably the death of Mr. Margary would be traced to the same source. In the mean time all that could be done was "to labour and to wait." It would of course be injudicious to press matters to an undue limit, but a certain pressure ought to be kept up by public opinion, without which all Governments were apt to go to sleep.

EXTRACTS OF LETTERS FROM MR. MARGARY.*

"Teng Yueh Chow, January 5, 1875.

"Here I am at the very end of China, and at the goal I sought. But I am going further. I had not arrived half-an-hour the night before last when a packet was put into my hands, from the Political Agent at Bhamo, announcing that the expedition was not yet started, and I was to join it at Bhamo, if possible, soon after January 1. As there are seven stages between, and a savage territory, I was obliged to well consider my plans, and it was 3 A.M. of the same night before I had resolved, written, sealed, and directed my answer, and prepared my messenger. The latter, after receiving my instructions, had three hours' nap, and called me at 4 o'clock to receive my final blessing ere he started off with my packet; for I determined to see him depart with my own eyes—and I was asleep again in five minutes. Yesterday I arranged business with the Mandarins, to-day I write letters and engage baggage-animals, and to-morrow I start again for the savage borders four stages off, to await my return messenger. If, as I hope, they have not started from that end, I go on; if otherwise, I drop back to await their arrival at the conjunction point of the three main routes, for the expedition are to follow a wide *détour*. I suppose they wish to survey a railway route. This letter will, I hope, go *viâ* Burmah, and outstrip the last three I sent you from Yun-nan, Ta-Li, and Yung-Chang, on November 29, December 18 and 29, which will drag their slow length along over many broad provinces before they reach the mail steamer at Shanghai. I am at the ancient city of Mômein or Teng-Yueh-Chow. It is in ruins. For only last year this remaining stronghold of the Mahomedan rebels became a scene of slaughter, and by falling into Imperial hands again put an end to the fifteen years' kingdom of Tu-Wen Hsin. I visited the Tartar General at Ta-li-fu, in the palace of this late worthy and much-to-be-respected rebel. I have no time, I am sorry to say, for a good long letter; but it is a great comfort to be able to gladden your anxious hearts with even a scrap from these buried wilds, and to be able to avail myself of the short cut through Burmah. You have done the same for me with three delightful letters, which reached me in a large packet from Hankow almost immediately after the one from Bhamo. Dates July 28 and two of August 11. . . . I might have got through two sheets by this time but for interruptions. The Brigadier commanding the centre division of the Army paid me a long visit, and brought his little boy with him. It is customary in China to give presents to children in such cases, and as I am all but cleared out of everything, I was obliged to give the little fellow a pair of tortoise-shell sleeve-links, which seemed to delight him much. I like these military men. They are devoid of that stuck-up pride of the literary Mandarins. I called on the General yesterday, and had a very civil reception. His name is Chiang, and he is much famed for a daring military feat which brought about the fall of Ta-li-fu. I was very curious to see the intrepid man who scaled the rocky heights behind the great city and dropped down in its rear. He has a calm, sphinx-like countenance and a charming smile. Yet this man slew thousands of Mahomedans on that day without quarter. It was his birthday, and he was giving a fête to the people. A sing-song was progressing in front of the audience daïs, and I had my interview in the presence of 200 or 300 citizens who thronged the courtyard.

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* These letters were addressed to General Margary, father of the traveller, and the extracts were communicated by him to 'The Times' newspaper, in which they appeared on March 17th and 18th.

"Territory of Nan-Tien, Jan. 11,
Town of Manwyne.

"I have travelled four stages further since I wrote the first sheet, through a beautiful valley inhabited by a people called Pa-yi, who are a mixture of Chinese settled here 500 years ago, and the Shans or Laotians, who cover the whole country between Burmah, Siam, Cambodia, and China. Their dress and habits have afforded me intense interest and curiosity. Divided into little principalities, three of which we have visited on our way, they are governed by native Chiefs, under Chinese supervision. In every case I have, of course, been the guest of the Chief, and, owing to their sociable dispositions, enjoyed a good deal of intimacy with their families. The women are not shy, like the Chinese, nor fear to talk with a stranger. Their dress is marvellous. I could not keep my eyes off the strange, picturesque figures that met me at every turn. The marvel consists mainly in their turbans, which outrival the busby of a Grenadier. They rise in concentric folds, backwards from the forehead, and attain a diameter of fully a foot at some height above the head. The head can be seen in the hollow behind, where large silver buttons attach the hair, which is plaited into folds. A neat little dark-blue jacket, fastened at the throat with a broad silver buckle, and short petticoats, tightly folded to the figure, of the same dark material and relieved by a phylactery of red, blue, white, and embroidered panels, give them a neat, homely look. They wear also embroidered shoes, and wrap their ankles and shins in blue embroidered cloth. I spent a whole afternoon surrounded by the male members of the family. They examined all my things, and I learned a good many sentences of their language, which they wrote down for me. They write, like us, from left to right, and the characters have almost a Roman look. The men are light, active, well-made fellows. They wear blue cloth round their shins, and expose the knee in a fashion which at a little distance looks uncommonly like the Highland dress. Sometimes dressed in pure white, with a red girdle, covered with a straw hat like a Leghorn, and carrying a long sword in the belt, they enliven the road with their picturesque attire.

"The earrings of the women are made of silver in profuse variety, and other ornaments of silver adorn both sexes.

"*January* 12.—I am still waiting my messenger, who ought to arrive to-night. I was quite tired out yesterday, and felt in no mood for writing a good letter. The above hurried account of these interesting people is very unsatisfactory, but you will understand how much I have to do. I was only able to snatch an hour in the afternoon for a stroll through the market. It was frequented by a number of queer little semi-savages from the mountains; most of them were women, and they certainly had a most repulsive scowl on their faces. Colour, cowries, silver ornaments distinguished their attire, and they moved about with a shuffling trot, throwing hurried glances right and left. *The men carried javelins, but* dressed much like Chinamen. These curious creatures inhabit the country lying between this and Bhamo, and the two stages ahead of us are infested by their dangerous presence. I am protected by the Chinese Government and so have nothing to fear. A famous ex-brigand, called Li-Hsieh Tāi, who attacked our last expedition in 1867, has been rewarded lately for his services against the rebels with a military command over all this country. He is here, and I felt much curiosity to see how he would receive me. To my surprise he prostrated himself, and paid me the highest honours. I had a most successful interview. He sent for a few notable townsmen and the chieftain of the savages, and introduced me with the greatest respect. We sat in a small room, badly lighted—quite a conclave—and carried on a regular battery of mutual buttering. Li told them I had come protected by an imperial edict and that they had better take care of me. This morning I went out with my gun to get some exercise, and having bagged half-a-dozen wild ducks, I have just sent a brace to the commander as a present. I took two of my servants, and we had great sport. The river was half a mile wide and full of sandbanks, on which duck rested. The first difficulty was to find a boat, and after searching up and down stream we were fortunate enough to find a diminutive punt under the bank without an owner, and calmly took possession of it; but we could not manage it against the stream with the slender paddle which was attached to it. A native, however, offered to paddle us over, and so, with the present of a little cash, we soon found means to be landed on a sandbank. Kicking off gaiters and boots, I waded about after the duck, and managed to bag a good many. We returned through the motley market with our spoil, and excited quite a sensation. Cries of 'Ah-a-ah!' in the peculiar high-pitched tones of these people greeted me, and they held up their thumbs to express their admiration of such prowess. I have bought one of the jackets worn by the little wild women, but cannot find a petticoat to complete the attire. The villages on this lovely plain are all embowered in groves of feathery bamboos and plantains. The latter are ripe even now, and I can buy any quantity for a couple of copper cash apiece. The weather is as temperate as we could wish. On the third stage to Teng-Yueh we rested at a little village nestled high up in a forest-clad mountain. It had been a long stage and full of magnificent scenery. After threading the long gorge, with a torrent dashing below, we entered a wide plain covered with a two-years' jungle growth, and crossed the Mekong River by an elegant suspension bridge. Darkness overtook us just as we began to mount up the steep, paved path which scaled the opposite mountain. Hastily procuring rough torches of straw, bound in sheaves of upwards of 10 ft. long, we found our weary way up the interminable staircase for fully two hours, not daring to stop for fear of our lamps not lasting. The latest spark expired as we woke up the village with our shouts. The valley below, as we zigzagged up the slope, presented a lovely illumination. The returning peasants were burning away the jungle from their long neglected fields. One of my men carelessly set light to the parched-up grass alongside our path, and immediately it blazed away down the hill, involving, I fear, many a young tree in ruin. Our Eyrie Rest could only boast of two or three simple huts, and we had missed the way to the Temple where they told us quarters could be found. It was fortunate we had, as on visiting it next day I found an open ruin. Chinese officials, however, had to put up in its dilapidated sheds. A fearful wrangling ensued, which I put a stop to by taking possession of a hut, which turned out to be a newly-erected one. We slept very comfortably, although the walls were only bamboo laths. Next day being New Year's Day, and, curiously enough, our not being able to procure carriers, caused us to stay in this lovely spot, and I resolved to rummage the forest for the game.

"Taking Bombagine (his faithful servant) and a boy to carry the provision-basket, I plunged into a wood-cutter's path, which soon came to an end, and we forced our way through jambrake breast high. All of a sudden an infernal noise woke the primeval echoes, and came nearer and nearer. Bombagine thought it might be a tiger, though it was as much like a feline roar as a trumpet to a whole brass band. It was more of a howl. I was not very well, and consequently nervous. I could hear my heart beating in the stillness, and felt quite annoyed at it. Eagerly watching for the coming beast, we stood on the *qui vive*. A heavy tread, as of some animal angrily striking the ground, was clearly audible. Just as I was preparing for a shot, however, the beast moved off, and, though we followed, none of us caught a glimpse of the mystery. I have not time to record any more of the numerous incidents that occurred. You must kindly wait until the journal is complete. It has already attained to three volumes of foolscap. I don't remember whether I have mentioned our goat before. Miles away back, at a now distant city, a Mandarin gave me a goat for food, but I saved it from the butcher's knife, and it has trotted along ever since, repaying us with much diversion. If I take a stroll it likes to accompany me. One day he ate up several orchids I had gathered with some trouble out of the forest, and the poor beast suffered two whole days for his folly. It was amusing to see my men petting it; they put it in a basket and made two coolies carry it. I mean to buy a monkey for it to carry on its back."

"Bhamo, Jan. 17, 1875.

"You will, no doubt, be surprised to find me in so advanced a position. But here I am safe and sound, and the first European who has travelled through the trade-route of the future. They sent me a Burmese guard of forty men, who conducted me through the savage Kachyen hills, and when we debouched on to wide, flat Burmese plains, covered with jungle and forest, on the 15th, just as the setting sun was bathing the wide expanse in colours, and the new life and semi-Indian manners and customs of the Burmese burst upon us as we rapidly trotted through their picturesque and homely villages, a delightful sense of relief and pleasure came over me and my Chinese companions alike. We slept in a Burmese bamboo cabin perched on hills, and next day floated down the river to Bhamo. It was one of the most delightful periods of my life to come in sight of the British flag again, and soon to be congratulated by a distinguished group of Indian officers on my 'splendid journey.' Colonel Horace Brown is a fine-looking man, with a heavy moustache and imperial. Dr. Anderson has the kindly manners of a *savant*, and I look forward with intense pleasure to spending hours in such intelligent company. We have an officer with a guard of five Sikhs, and a host of baggage animals and countless stores. The steamers are going soon and I am pressed for time, so can only add a sort of 'latest intelligence.' We shall follow a long round, I expect, and very much doubt if May will nearly put an end to my long travels. I am the picture of health, as people tell me, and you may imagine how full of delight I am at the happy result of my journey and the glowing prospect ahead."

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *The Modoc Region, California.* By William Simpson, F.R.G.S.

The late savage contest which took place with the Modoc Indians may give some interest to the present account of the region where the events occurred; and as almost every mail from America is bringing news of risings and rumours of disturbances among the Indians in various parts of the Far West, a slight sketch of the bloodthirsty struggle, which was dignified with the name of war, will at least explain one cause of this unburying of the hatchet, and show why the red-skins are manifesting so strong a tendency to enter upon the war-path.

In the case of the Modocs, the subject of dispute may be correctly termed *geographical*. Ever since the arrival of the white man in America he has been extending his occupation of the soil, and pushing the original proprietor into the outlying regions. At least, the few who have not been pushed out of existence altogether can only find shelter in far away districts, and on the poorest kinds of land. Every day sees the area of cultivation enlarged, and the hunting-grounds of the Indians reduced in extent. Considered from a philosophical point of view, the displacement of a race by another of a higher type is no cause of regret; and yet there is a sentiment in the human heart which cannot look upon such vast tribes becoming extinct without some touch of sympathy; and it is most creditable to the American people that they have this feeling, and have attempted to give expression to it through their Government.

A department, known as the Indian Bureau, was appointed, money was granted to procure necessaries for the Indians, and lands were reserved for them in some of the Western States. This Indian Bureau and its agents have not made for themselves a very high character. In fact, they seem to have earned no other repute than that of malversation in every branch of their department; and to this fact may be traced the troubles with the Modocs. The reservation lands in this section of the States, selected by the Bureau, are in Oregon, east of the great Klamath Lake, and they are so high, cold, and poor, that nothing but sage-brush is to be found; and it is a current saying, that where you find sage-brush nothing else will grow: even the poorest crops of rye are produced with difficulty from such a soil. A number of the Modocs had been sent to these reservation lands; but they returned to their old haunts, for they said they could not live in a region so barren, and that they would rather die than go back again. It was from an attempt with troops to force the tribe to these lands that the war began. The Modoc Indians were long noted for their dogged determination; they were the most warlike of all the Indians in that region. Before the white settlers came there, they had thrashed all their neighbours, and since the white man has come their relations to him have been marked by the most bloodthirsty struggles—the late war being perhaps the most sanguinary of all. I heard of another tribe, somewhere about the upper sources of the Missouri, who were sent to the reservation lands, and being of a more peaceful character than the Modocs, went quietly away with the military, and after a march of a good many days, were deposited safely. The soldiers having performed their duty, in this instance returned; but guess their astonishment to find that the Indians had passed by another trail, and were all back again before them. This will indicate the antipathy these people have to live on the miserable locations which have been reserved for them, and will explain one cause of the late movement among them; and the geographical nature of the question will also be understood now from what has been stated.

I chanced to arrive in San Francisco at the moment when there was an intense excitement resulting from the treacherous massacre of General Canby, and others of the Peace Commission, by the Modocs, and I determined to visit the scene of events. The distance to be travelled was nearly 400 miles away north to the boundary between California and Oregon. General Kelton, of the head-quarters of the army of the Pacific, kindly gave me letters of introduction to facilitate my movements, and to insure my reception at the camp of the United States troops; and I must express my gratitude for the manner in which I was received by all I came in contact with during my expedition. The railway is in working order to the northern end of the Great Sacramento Valley, which is terminated by the Sierra Nevada Chain, and what is known as the Coast Range of Mountains, coming together, and forming a mass of hills and valleys, amongst which are the sources and streams which supply the Sacramento and Klamath rivers with their waters. The expense of constructing a railway in such a country would be too great for the limited population who have as yet settled in it. So the "stage," as it is called in California, which means stage-coach, is the usual conveyance. These are to be found all over the country, and if the roads were good they would be a tolerable kind of conveyance. They are large vehicles, painted red, and hung upon a mass of strong leather straps, which serve the purpose of springs. From the condition of the roads, travelling in them is rather rough. By imagining yourself rolled down a hill inside a barrel, you may form some idea of the amount of comfort to be enjoyed in this mode of conveyance; the chances which a traveller and the barrel would have from rocks and precipices are precisely similar to the risks to be encountered in this piquant kind of travelling in California. I copied an account from a local paper of one of the frequent occurrences which take place by this mode of conveyance. It had an interest to me from the fact that I had made a journey in the same vehicle, and made the acquaintance of the owner, who was a noted character, named Foss. He is described as "the famous dare-devil stage-driver of California." The account states, that "on the 29th June, Foss was driving his waggon, with three or four gentlemen, a lady and four children, as passengers, in his usual *dare-devil* style, when somehow it capsized, dragged along, tearing off every seat. The four leaders then became detached and ran away; the waggon was left bottom upwards, the lady was found with her children all bruised, and her skull fractured; the four gentlemen have not since been heard of, and the dare-devil driver himself was discovered against a fence, senseless and raving, being injured internally." A farther statement puts it, "that Foss is pretty badly bunged up, the coach is a perfect wreck, and what became of the horses no one is able to say. Altogether the dare-devil driver of California seems to have demolished himself, his waggon, his horses, and his passengers, and to have added fresh laurels to those which already encircled his brow." Foss had six horses in his coach, and I must speak of the great kindness with which he—and the same will apply to all the drivers I met with—treated his animals. I had nearly thirty-six hours, continuously, in one of these stages to get to Yreka, the base of supplies to the Modoc Expedition. I could have wished to have done it on foot, so as to have seen and enjoyed the attractions of the scenery. At first it seemed much of it like an English park, beautifully wooded; and whoever remembers the discovery of the auriferous deposits in California, and also remembers the numbers who rushed to that country—gold being the lodestone of attraction—would have felt, I am sure, the same interest which I did on seeing the spots still bearing evidence of the hard and laborious work which had been expended. The red earth was still bare, and one could trace for miles the channels, with wooden aqueducts over hollows, by which the water was brought to wash out the precious deposit. Here and there a Chinaman might be seen toiling away at the all-but-exhausted diggings. These incisions and abrasions on the original surface are so many, and so deep and marked, that I believe, no matter how Nature may endeavour to cover them, they will be visible in the future, and the gold-digger's operations in that part of the world will have to be included as one of the geological or geographical features to be considered as influencing the strata of this period.

Our route lay up the main stream of the Sacramento to its source at the base of Mount Shasta. All along were splendid pine forests; each tree was tall and straight enough to be the mast of a ship. Mount Shasta is, according to the best American authorities, 14,440 feet high, and it is said to be, with the exception of Mount Whitney, which is in the south of California, the highest point of land in the United States. Mount Shasta is an old volcano, and is important because it is expressive of the past character of the region. It is the father of a large family of volcanoes, all now extinct, which have produced the lava, in whose curious labyrinths the Modocs fought so well. It is still evident that the underground fires are not yet quenched. Near the summit of Shasta is a hot spring, with sulphurous gas; I drank soda-water from a fountain flowing plentifully at its base. Hot springs are common; and the tribe of "Warm-spring Indians," by their name, express the character of the region. At Calistoga, to the west of the Sacramento, the ground for some distance steams with vapour; and there is an establishment, with hot sulphur baths, which is now being largely frequented. The Geysers, to the north of Calistoga, are in a cañon, extending for about a quarter of a mile, all steaming and boiling: in one place the vapour comes out with such force that it whistles like a railway engine. Sulphur, alum, cinnabar, and many other chemical compounds, are ejected at this spot. Earthquakes are still so frequent in California, that the people of San Francisco do not care to risk building their dwelling-houses of stone. Away to the east of the Modoc country is the lately-discovered region, known as the Yellow Stone River, which is noted for its splendid specimens of Geysers and hot springs. Such is the present condition of the locality, and it all helps to tell us what the past must have been; but only a personal inspection of the numberless craters around Mount Shasta, and of the quantities of lava which they have sent forth, can enable one to realise the terrible forces which must have been in action in former times.

Mount Shasta has much about it to recall Fuji-Yama in Japan. The altitude of both is something similar, but Shasta has a slight advantage in this respect. On the north-west side of Shasta there is an old crater, not much lower than the highest peak; this forms a huge shoulder on that side, but seen from the other directions it is almost a perfect cone. Fuji-Yama is a sacred mountain, and Shasta appears to have had a similar character with the Indians. It seems to have been their Mount Olympus; but there is a dash of the Inferno in their notion, for their god or gods existed within the fiery mountain, and they derive their own origin from the crater. The Great Spirit dwelt in it; and, many thousand snows ago, he sent up his daughter to the mouth of the hole, bidding her tell the storm, which blew from the sea, to be more gentle, or it would blow over the mountain. In doing this she was carried by the force of the wind down the steep sides, and fell into the hands of a family of bears, who seem, according to the tradition, to have been the highest development of life at the time. These bears kept the girl, and married her to their eldest son, and from that pair the Indians originated.

The girl was red, and from her they inherit their "Red Skins," by which title the Indians are still known.

As the icy waters of Shasta on the south form the highest sources of the Sacramento, so the Klamath receives the drainage on the north. It flows in a considerable stream through Shasta Valley, which is an undulating plain, extending about ten or twelve miles: at least, I take it to be about this from west to east, which was the line of my route. I passed it early in April, so it was still green and bright with flowers of all colours, for which the whole of California is celebrated. It is surrounded by mountains, well wooded towards their bases; and the snowy summit of Mount Shasta towering high away in the south, gives a grandeur to this point which will make it a noted scene in times to come, when tourists are more plentiful in that out-of-the-way quarter. The region of past volcanic eruption begins to appear as the traveller enters Shasta Valley; and from that point it looks as if the principal crop of craters had been produced to the eastward of Mount Shasta. The ridge of mountains which lay before me, and which separates Shasta and Butte valleys, was well marked with volcanic cones; and away to the south, round the ampler base of Mount Shasta itself, was an innumerable mass of brown mounds, having in the distance much the appearance as if a shower of plum-puddings had come down, each having been in its day a source of burning matter.

The boundary between California and Oregon is drawn along the line of the 42nd degree of north latitude, and is close to the north of Shasta Valley. Siskiyou is the name of the county, within which is Mount Shasta and the Modoc country. Yreka is the name of the county town, situated on the north-east of Shasta Valley. It is a straggling town of a few streets, with wooden houses. It began with the mining, and is still a centre of importance for gold operations. Being the nearest town to the Lava Beds, it was the base of supplies during the Modoc campaign. The stage-road goes on north into Oregon, so that had to be left at Yreka, and the rest of the journey, which was estimated at about 80 or 90 miles, had to be done over what was little better than a trail.

Just on leaving Shasta Valley on the east we passed a mineral spring, the water leaving an incrustation of white all round. As we began to ascend, the rocks bore evident marks of volcanic action; in many places they had more the appearance of cinders than of stone. Higher up the ravine this burned appearance ceased, and large mounds and ridges of stones and rocks came into view, which I took to be glacial moraines; if this is the case, it indicates that the fiery and the freezing-powers must have been in very close contact all over this district at some long past date. It was a long pull up this glen; at last, "Bull's Meadow," by which the top is known, was reached, and we descended to Butte Valley.

At the base of the hills here I made my acquaintance for the first time with the European settler who lives on the boundary, where our civilisation ends and the condition of the primitive race begins. The Spanish word "ranch" is still retained, and in this quarter it means a great many miles of land with thousands of cattle on it. The dwelling was a rude log-hut, whose floor was not much different in cleanliness from the ground outside. My bed for the night was on this, with a blanket I had luckily brought with me. The morning ablutions, for those who cared to perform them, were done in a small stream near the door; a dirty towel hung at the entrance, near to which was nailed, by means of a string, a comb with two or three teeth still left in it, and a small empty frame which had once contained a looking-glass. In none of the ranches in this out-of-the-way quarter did I see a European woman. The proprietors, I was told, were very wealthy, and the number of dollars they were worth was often mentioned to me. Still if a sort of Missionary Society were to be formed to send out soap, brushes, combs, needles and thread, and similar articles which we consider to be essential as the first necessaries of civilisation, with some person to give instructions as to their use, I should at once subscribe to it as one having the most charitable of purposes. I think I never saw such dirty, uncombed, and ragged specimens of humanity. In one of these ranches I was thoughtless enough to go into the place where the breakfast was being cooked: I will not describe the cuisine to you; it will be enough to say it was quite in keeping with the surroundings. It will complete this picture of the condition of these advanced settlers to state that their morality presented a similar tendency to backwardation, for there was generally at these ranches a *wikieup*, or rude tent of mats and branches, inhabited by Modoc women; and a mixture of races, which would, no doubt, be of the highest importance to the ethnologist, was rapidly taking place.

I was very anxious to get on to the Lava Beds, for information had reached me that General Gillem had attacked the Modocs, and that fighting was going on. A courier had arrived with news that after three days of a hard struggle the Modocs had managed to escape with their wives and children, and it was supposed that they would now be loose, and all over the country, and it was known that, as they had unburied the hatchet, no quarter would be given to any white man; along with this came intelligence of their having shot, scalped, and mutilated in various ways, one of the teamsters employed by the Government. Ball's Ranch was the first place of the kind I had reached in Butte Valley. It was full of teamsters *en route* with commissariat supplies, and the courier, who had just come in, was recounting the events of the fighting. When he told that the Modocs had escaped, and were most probably scattered about with the object of murdering every person they came across, it produced a complete scare among the teamsters. They all declared, in language seventy-five per cent. of which had reference to a hot region far beyond the limits of our geographical knowledge, that they would not go on to the front. The man who had brought me from Yreka also refused to go on. This was very awkward for me; I was only about 50 miles from the scene of operations, and yet I could not move a step. I could do nothing but submit; and it was sitting round a blazing log-fire that night listening to these men that I learned something of the past history of the Modoc tribe.

The most of the men I found myself among belonged to the region; some of them were from Oregon. They all knew the Modocs, so that they could speak from personal knowledge. One of the routes by which the early settlers first came, in that weary journey across the Rocky Mountains and over the sage-brush deserts of the higher plateaux, passed through the Modoc hunting-grounds. As this warlike tribe had vanquished all the other Indians about the district, they claimed some kind of toll, or blackmail, from all who passed through. This led to fighting, and many a train of emigrants perished. When the settlers got more plentiful the war of races went on. The Modoc's hand was against every man, and the hand of every man was against this Ishmael of the West. The present war was only the continuation of a strife which had lasted for about a quarter of a century; and events of twenty years back were curiously linked to the murderous deeds which were going on. About that number of years past public feeling had been very strong against them, and their extermination was even proposed, and plans were laid to accomplish it. I heard it said that a "Big Talk," or council, had been suggested, and the plan to be carried out was to make a "muck-a-muck," or a dinner, a part of it, and poison them all. The Big Talk was certainly carried out, where every white man came heavily armed, and at a given signal the slaughter began. About 40 or 50 Modocs were present, and only about half-a-dozen escaped. A certain Ben Wright bears the reputation of having been the leader in this act of atrocity. The tribe never forgave nor forgot. Some of them watched Ben Wright for years, and he was found one morning murdered in his bed.

When the Washington Government appointed General Canby, Dr. Thomas, and others, as Peace Commissioners, to arrange with the Modocs about the reservation lands, or some suitable grounds for them to dwell upon, it was the memory of Ben Wright's massacre which rendered it so difficult to arrange a big talk with Captain Jack and the Modoc chiefs. Each suspected the other from past experience, and months had been wasted before either would risk the danger of a meeting. At last a council was agreed upon, to meet at a point halfway between the two camps, and each was supposed to come unarmed, and without escort. The Modocs, either from a feeling of revenge for past injuries, or from thinking that their opponents would not act up to the terms, or perhaps impelled by their own traditions that while the hatchet was unburied blood must flow, or perhaps foolishly imagining that if the chiefs of the White Skins were numbered with the dead, victory would be certain to follow—came with concealed arms, and, at a signal from Captain Jack, they all drew their weapons, and General Canby and the Rev. Dr. Thomas were instantly shot down; all the others of the party escaped, one only being wounded. This foul assassination naturally roused the indignation of the whole people of the United States. The misfortune for the Modocs themselves, was, that they had murdered their best friends, for both General Canby and Dr. Thomas were men of the highest character, and were really anxious to carry out the wishes of the Government, and make an arrangement which would be for the advantage of the tribe.

Round the log-fire that night in this wild region I was a good listener, for I was hearing tales related from personal experience of those who had been engaged in them, which would have made novels or dramas. I heard stories of the diggers who came there when the discovery of the gold brought men from all quarters of the globe. Much of what I heard had reference to the Indian tribes of that region, and many deeds of murder and lawlessness were told. The men I found myself among were a rough lot; their quaint idioms and the overwhelming proportion of profane words were quite new to me, yet differences of character soon appeared, and I could see that some of them, in spite of the rough manners and rude phrases, were very good fellows, and my experience of them during the next two days confirmed this impression.

No news had come in during the night, and next morning the teamsters were in the same state of mind as before. There was the usual amount of wild oaths in explanation of what they would do. No one would venture a step towards the front. The certainty of being killed and scalped by the Modocs, should any of them be encountered on the way, acted as a strong motive to remain where we were. At last one said he would go if anyone else would go. I had dismissed my driver, so I at once volunteered; and this led to other three teamsters coming on, one of them giving me a place with my small bundle of luggage.

The first part of our day's journey was along Butte Valley. The word Butte I take to be from the French, meaning a height.* This valley is the old bed of a lake, part of whose waters are not dried up, and are yet to be seen on the north. The level surface of the ground was covered with small plants and bushes. Among them the well-known sage-brush predominated. Another feature of this part of the world here presented itself to me for the first time, that is alkali: this with the sage-brush are the striking characteristics of the higher regions of this part of America. Patches of the ground between the sage-brush are white from the alkali, as if hoar frost or snow had fallen. It is as if there were leprous spots on the ground. No vegetation grows where the alkali is seen. Bret Harte describes such a place as an "Alkali desert," and the description is true; they are perfect deserts, not quite so bare as the sandy Sahara, but they are bleak enough, and sometimes of sufficient extent to be considered as the deserts of the Far West. Some good specimens of these deserts are passed on the Pacific Railway; one near the sink of the Humboldt River may be instanced. Butte Valley may be about 15 miles across; we left it towards the north-west extremity, and passed some small lakes, and after getting over what was considered to be about 25 miles, we reached Doris's Ranch in the evening, with our scalps all safe. After supper, four of our party ascended to a hay-loft, which was a most comfortable bedroom after the hard, dirty floor of the previous night. Before turning in we looked to our defences, for we had now reduced our distance from the Lava Beds to one day's march, and as the Modocs had escaped two or three days before, they might be upon us at any moment. We had a rifle and a revolver, which were placed ready, and the logs of the building were quite bullet proof, so we could have made some defence; but a lucifer-match would soon have dislodged us, for the ground all round was littered with hay and straw. Luckily we were not disturbed during the night.

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* In the middle of the Sacramento Valley there stand up a number of high rocky peaks, and they are known as the Buttes Mountains.

As nothing had thus far occurred, the confidence of the teamsters was restored, and next morning there was no thought of fear as to going on; and luckily when we reached Fairchild's Ranch we found a cavalry escort coming out with some teams, and they returned back with us. One part of our route lay along the margin of the lower Klamath Lake. Away to the north we could see a volcanic-looking cone, white with snow, known as Maclachlin's Peak. When we got to about 5 or 6 miles from the camp, we met a team with the body of the teamster who had been killed by the Modocs; his name was Eugene Hovey. The mutilated corpse was in a rough deal coffin. It produced a considerable impression on our teamsters, and a man belonging to Yreka, of the name of Glen, came up at the same time, looking wild and frightened. He pointed to a spot about half a mile behind, and stated that a rifle had been fired at him as he passed. The two incidents combined to produce a feeling of great terror, and a corresponding amount of profane oaths. The sergeant in command of our escort made the teams keep close together, and he and one or two of his men went cautiously forward to reconnoitre the spot where Glen heard the shot, but no Modocs were to be seen, and we all went along undisturbed. The conclusion I came to was that, owing to the fear which the Modocs had produced by the determined way in which they had fought, and from the merciless manner in which they had murdered and mutilated all who had come in their path, the heated imagination of this man, or perhaps the clink of his horse's foot on a stone, had made him believe he had been shot at. The rest of the way to the camp our road had a high rocky bluff on the right, from which two or three Modocs might have shot down the whole of our party with the greatest ease; the state of terror every man was in would have paralysed them at once had an attack been made. When we were only about a mile from the camp an advanced cavalry piquet gave us the information that the Modocs were just then making an attack on the camp. The effect of this news on my friends was great, they all wished themselves back again safe at Yreka; but in making this, and similar statements, there was even more than the usual seventy-five per cent. of terrible oaths put into requisition. It turned out that the Modocs had come down to the lake for water, and while doing so, they fired one or two shots into the camp merely to distract attention.

At last we reached the bluff overlooking the Lava Beds and the lake. The camp of the United States' troops lay below us, at the south-west corner of the lake. About 3 miles to the east was the main line of the great lava stream which had run from the old craters, still visible about 7 or 8 miles away to the south, and it was in this now rocky mass at a point close to the lake that about 40 or 50 Modocs, for that was the estimated number of the fighting men, had kept ten times as many at bay for about six months. The sheet of water is known as Tulé Lake, the word Tulé being the name of a high reed which grows plentifully along the margin. It is likewise known as the Modoc Lake, and also as Rhett Lake, being named like many other places in America from the officer who first surveyed it. It forms one of a group of lakes, of which the Great and Lower Klamath Lakes, Goose Lake, and Clear Lake are the most important. A considerable stream runs from Clear Lake into the Modoc Lake, which is called "Lost River," because no stream is seen to flow from the latter.

"Pit River" rises a number of miles away to the south, and as its name implies, its source is from a hollow or pit, from which it issues a full-grown stream, and the supposition is that it is the water of the Modoc Lake which finds its way through by some underground passage produced by one of the volcanic convulsions of times long gone by.

The Modoc Lake may be about 10 or 12 miles in extent. It is said to be about 600 feet above the sea, and its waters are very slightly salt, but there are plenty of fish, which was one of the attractions to the Modoc tribe. The banks of this lake and the Lower Klamath were their favourite hunting and fishing-grounds.

They were encamped on both sides of Clear River, in wikieups, or wigwam tents, just where it enters the Modoc Lake at its north-west corner, when it was first tried to force them back to the Reservation Land. About 30 mounted troops came to execute this duty, the Modocs resisted, and a skirmish ensued, in which the troops had to retire with some killed and wounded on their side. This was the first victory gained by the Modocs. The Indians then fell back with their squaws and papooses on the Lava Beds; those on the one side of Clear Lake came by the west margin of the lake, and those on the other went round by the east. There were some settlers living on that side of the lake, whom the Modocs murdered as they went along. In this out-of-the-way region, far away from railways, and where there are only handfuls of troops scattered about in distant parts, it was some time before a sufficient force could be brought together by the United States authorities. At last about 450 men were collected; and as it was known that there not over 50 bucks, or fighting men, among the Indians, it was assumed that they would not be able to resist. In this the soldiers found themselves entirely mistaken. They had not as yet discovered the strength of the position taken up by the Modocs in the Lava Beds, and the result was that they were beaten back with a loss of 10 men killed and 29 wounded.

It was after this engagement that the Government at Washington appointed General Canby and others, as a Peace Commission, and made the effort to get the matter arranged without further bloodshed, and which was frustrated by the Modocs assassinating the Commissioners at the first Big Talk which took place. General Gillem, on whom the chief command devolved after Canby's death, had over 500 men, and he got ready to make another attack on the redoubted Lava Beds. Taught by former experience, the attack this time was made in the form of a siege. The Indians had good weapons, and the rifles and ammunition of all the soldiers who fell in former engagements came into their hands, so that they were well armed, and deadly in their aim. Accordingly the soldiers made cover with the loose blocks of lava, and advanced slowly and in safety. Instead of fighting a battle as before, the attack was more in the character of a siege. The Indians were surprised at the new tactics, for they expected that the soldiers would have retired to their tents again in the evening. There was another feature of this attack which very much astonished the Modocs, and that was four small mortars, or cohorns, the shells of which were quite a new sensation to them. These Indians never had seen or even heard of shells before. It was reported afterwards that the first which was fired was lifted by a Modoc, who held it in his hands to look at the fuze burning; his conclusions regarding the novel phenomena are not recorded, but his fate was most instructive to the rest of the tribe. They had very decided objections to these projectiles, and expressed themselves afterwards that it was unfair to fire cans of powder at them.

For three days and nights these Indians fought valiantly; but seeing that their opponents were slowly advancing, and that they might be hemmed in, they evacuated the place, and managed to get clear off with their squaws, children, and baggage. This retreat was quite as masterly as that of the Russians when they left Sebastopol. The Modocs only retired a few miles to the south, and took up another stronghold in the same stream of lava. From the experiences of the past it was felt that more troops were required to follow up and attack the Indians on such ground.

While waiting for reinforcements, a scouting party, on a reconnaissance, was sent out, under the command of Major Thomas, a young brave officer, who had been all through the war with the South. Its object was to get some knowledge of the locality, and to see the sort of position occupied by the Modocs. They went some miles over the lava, but could see no trace of the Indians. There were about 60 men and 6 officers of the party. Before returning, they sat down to rest and to eat some lunch, and while doing so, a volley from the Modocs was fired into them. Although they had seen no Indians, the Indians had seen them. Surprised and taken at a disadvantage, and no doubt under the influence of that fear which all had for the Modocs, it became a *sauve qui peut*. The officers did all they could to rally the men, but to no purpose: 17 were killed, including all the officers, 12 wounded, and 5 were missing, being more than half the whole number of the scouting party.

This war had now lasted about six months, and this mere handful of Indians were entitled to claim every battle—if battle such skirmishes may be called—which had taken place. It formed a strange contrast to the Franco-German War which had just preceded it. Had the Modocs not committed the crime of assassination they would have earned the sympathy of everyone. After the engagement last described, dissension seems to have grown among the tribe, and at last a number of them gave themselves up to the United States troops; reinforcements also arrived, and after a hunt of a few weeks all the Modocs were at last captured. A military commission was appointed to try them; and Captain Jack, Schonchin, Boston Charley, and Black Jim, being the principals connected with the assassination of General Canby and Dr. Thomas, were sentenced to death, and executed at Fort Klamath.

Accounts one used to read of the American Indians represented them as braver, or more stoical, when undergoing punishment than when fighting with their enemies. If the Modocs are to be taken as types they seem to have altered much. These men who fought so pluckily became abject cowards when the gallows was before them. Captain Jack begged for his life, and even proposed that Scaur-faced Charlie, who was a relative of his, should be hanged in his stead. Boston Charlie was the only one among them who died game, and he called the others "women."

As my visit to the seat of war took place a day or so after the evacuation of the stronghold in the Lava Beds, I was able to visit the spot. Seen from a distance no one could imagine the existence of such a place as it turned out to be. On the first attack, those in command had no idea of the sort of position they were going into. It was not till the Indians bolted and the stronghold was entered that its true character was seen and understood. Bret Harte's description of "Alkali Station" will so far describe the first look of the region:—

> "Alkali, rock, and sage:
> Sage-brush, rock, and alkali."

Standing at the camp there lay before one many miles of this sage-brush and hard lava rock, a perfect wilderness. Seen from the distance anyone would suppose that walking across it would be easy, but this notion is soon destroyed. The lava seems in cooling to have cracked, and opened up into fissures of every shape and size. In some places there are deep valleys with steep precipices; in others there are round crater-like caverns: a piece of sponge would be a miniature model of parts; a rabbit warren on a gigantic scale, or an ant colony with Indians for insects, may convey some notion of this petrified stronghold. Anyone accustomed to fortifications might well fancy that a military engineer had planned it. Long cracks and fissures did duty as trenches; there were places like zigzags, others like bastions, redoubts, redans, epaulments, curtains, sally-ports—in fact, every feature to be found in a fortified place—all constructed of solid rock, as hard as adamant. As this intricacy of form has been all produced downwards into the original bed of lava, these works were thoroughly on the Vauban principle, and hence it was that they could not be seen by the attacking party. The Indians had supplemented the original construction by throwing in rocks to fill up gaps, thus completely covering themselves. On commanding points they had erected small rifle-pits with blocks of lava, exactly like those which played so important a part in the siege of Sebastopol. Low dwarf walls of the same material had been thrown up where Nature had forgot to leave a ridge of lava, and from behind these the Indians could lie and use their rifles. Every line of approach or point of attack was as completely covered as if a Todleben had been the engineer in command. This will now explain how it was possible for such a mere handful of men to hold out, and it will be understood that the first attack on it must have been as hopeless as if an army had been marched up in the open before the guns of Metz or Strasburg.

I visited the much-talked-of cave where Captain Jack and his family lived in the Lava Beds. It had the appearance of being a crater, or it suggested that an air-bell had made its way out in the process of cooling, and left a hollow space in the lava. It indicated the primitive condition of civilisation reached by the Indian tribes of this region. Whilst sketching its details I could see the relics scattered about which were left, and which differed but little from what are found as vestiges of the ancient cave people. Not a stone seemed to have been removed to make the place comfortable. In the centre were the ashes of the fire; around it were bones, some of them picked, others with bits of meat in a putrid state. I may mention that the Indians lay past meat—*cache* is the word they use for this—and that they rather prefer it in a high condition, much as Highlanders love *braxie*, or as some people like game. There were horns of cattle and hoofs; skins, some with hair on and others without, such as they make mocassins from. Fish and fish-bones were scattered about. Nothing seemed to have been thrown out; the kitchen midden-heap did not seem to have been invented, for all these articles were littered around in the cave, some in corners and some in ledges of the rock; and it only wanted time to get them imbedded into *débris* to form such remains as are being now found of the ancient cave-people.

The Indians, as I saw them in this part of the world, and while coming east by the railway, have all, more or less, adopted parts of the European clothing. This statement applies to both men and women; and I may add that it is the cast-off clothing of the whites that they use. General Canby's body was found after the massacre in quite a nude state, and Captain Jack had donned the uniform. They still manifest the primitive love of feathers and a liking for bright bits of cloth, and the women rub a red colour on their faces, which shines like a concealed fire. Although they have breech-loading rifles of the latest pattern, bows and arrows were found in the Lava Beds. I managed to get one of these bows and two arrows, which I sent home to Mr. Franks for the British Museum. Flint-headed arrows are still used, and one of those I sent home had a piece of obsidian for the head. They still poison their arrows; the poison is made from a coyoté's liver, which is kept till it becomes putrid, and a rattle-snake is made to bite it, so that it is injected with the deadly poison. With this the arrows are touched, not on the points, but on the shaft close to the arrow-head. I need scarcely say that even with the Indians these primitive weapons are become things of the past; I was told that only old men and boys use them now.

Cremation is a custom with the Indians; and during the three days' attack on the Lava Beds large fires were seen, which were supposed to be the burning of the dead with the larger roots of sage-brush. Only four dead bodies were found after the stronghold was evacuated; and from some ashes and teeth being discovered, it was supposed that they had burned those who were killed in the earlier part of the fighting.

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2. *Notes on Arizona.* By the Hon. CHARLES D. POSTON, U.S.

ARIZONA is a territory of the United States of America. It is formed out of that part of the State of Sonora which was acquired by the United States from Mexico—the portion north of the Gila River having been ceded by the Treaty of Guadaloupe Hidalgo in 1848, and the portion south of the Gila River having been purchased by the Gadsden Treaty in 1853, for the consideration of ten million dollars.

A civil government was organised for the recently-acquired territory, by an Act of the United States Congress, approved by President Lincoln, on the 24th February, 1863. This Act of Congress first defined the name of the new territory as "Arizona," the Spaniards having formerly called it Arizuma, after the Aztecs; the name probably meaning rocky country, from *ari*—rock, *zuma*—country. The territory contains 77,383,680 acres of land, and is divided into five counties. The civil government of the territory is under control of a governor and executive staff, appointed by the President of the United States, assisted by a legislature composed of a council of nine, and a House of Representatives of eighteen members, elected by the people. This legislature, with the approval of the executive, enacts the local laws; but all their acts are subject to the approbation of the Federal Congress at Washington.

The first account given to the European world of this part of the American continent was the romantic story of Friar Marco de Niça, who made an expedition among the Indians of this region in 1535. He reported a semi-civilized people, living in stone houses, dressing in clothes of their own manufacture, tending flocks and herds, cultivating the soil, and practising the arts of peace. This account led to the celebrated expedition of Coronado, which was organised and conducted under the patronage of the vice-royalty of New Spain in 1540.

The Indians described by the early Spanish explorers live in the north-eastern part of the territory, about 6000 feet above the level of the sea, in seven towns, which the Spaniards called the "Seven Cities of Civola" (the Cities of the Buffalo). The Spaniards called every hamlet a "city," and every stream a "river." These Indians are called "Moquis." Their villages are in lat. 35° 55′, long. 110° 42′, contain some six thousand souls, and have excited more than ordinary curiosity.

Without inquiry into the origin of these interesting Moquis, we know that they at present inhabit their mountain fastnesses, composed of seven federated towns. Each town is built around a rectangular court, with stone walls, without any gates or doors, the inhabitants ascending and descending by ladders, which are taken in at night for safety against predatory incursions. The successive storeys are set back, one behind another, in pyramidal form, the lower rooms being reached through trap-doors. The arrangement is as strong and compact as could well be devised; but the strength of the position does not protect the flocks and herds of these mountain pastorals from the depredations of their nomadic neighbours, the Apaches and the Navajoes, who make continual incursions, and carry off great numbers of their sheep, cattle, and horses.

The Moquis have small hands and feet, but ordinary figures; their hair is fine and glossy. The men wear loose cotton trousers, and frequently a kind of blouse for an upper garment, over which they throw a blanket. The dress of the women is a loose woollen gown, with a gold-coloured stripe around the waist and the bottom of the skirt, the stripe being of cotton, which they grow in small quantities, the material of the dress being wool of their own weaving. They are a harmless, well-meaning people, industrious, and honest for Indians. They lack force of character, and the courageous qualities of their neighbours. The Moquis are identical in race, manners, habits, and mode of living; but, singularly enough, although living within a circuit of ten miles, they do not all speak the same language, as they have had petty feuds, and abandoned the habit of visiting each other, until the languages have gradually become dissimilar.

The Pima Indians, who have a row of villages on the Gila River, 180 miles above its mouth, are very interesting aborigines. They have inhabited their present location from time immemorial, and have preserved no tradition of their migration. Their government is conducted by an hereditary chieftain, assisted by a council of sages, and their laws are administered with wisdom and justice.

The Pima Indians have for ages cultivated the soil for subsistence. They produce wheat, corn, pulse, melons, pumpkins, tobacco, cotton, grapes, and vegetables, and rear horses, cattle, sheep, poultry, &c. &c. They were weaving cotton for their own clothes when the Spaniards first discovered them, and samples of their manufacture were sent to Spain by the *Conquistadores.*

If they practise any religion, it is the worship of the sun. At sunset a preacher mounts the ruins of a former temple and delivers an oration to the parting luminary, and at sunrise the coming of the source of all life is hailed by some devotee with a like ceremony. The Pimas, as all North American Indians, believe in a Great Spirit, and a future state of rewards and punishments. They are very superstitious about "Cuetes," or spirits of the departed, and believe that they are yet hovering about them for good or for evil.

The village numbers some seven thousand inhabitants, and a more orderly, contented, and happy community can scarcely be found. They bury their dead, and can never be induced to mention their names afterwards. The Pimas have kept up a desultory warfare or defence of their plantations against the inroads of the nomadic Apaches, who have always been enemies of their peaceable and industrious neighbours. They make frequent campaigns against the Apaches, and often diminish the number of their savage enemies. Upon returning to their villages, if the Pima warriors have shed the blood of their enemies, they paint their faces black and fast until the next new moon. If they have not shed blood, they return to their homes with their faces painted white, and, without doing penance, enter into the enjoyments of domestic life. The chastity of the Pima women is remarkable, and but few well-founded charges can be brought against their virtue. The old men attribute the chastity of their women to early marriages, and the facility given by custom for the exchange of an unsatisfactory companion—the young being allowed to "swap" or exchange partners if the union proves unhappy or unfruitful.

Avarice, or the accumulation of wealth amongst the Pimas, is reduced to a minimum by a custom which may be practicable in primitive communities. All property accumulated during life reverts to the community after death of the owner; the domicile of the deceased and his personal effects are burned for purification. A Pima Indian, therefore, has no inducement to acquire property beyond the wants of this life, as it cannot descend to his posterity.

In several parts of the territory are to be found the ruins of a pre-historic race. Near the Pima villages are the "Casas Grandes," or grand houses of the Aztecs, or Toltecs, or whoever inhabited this region thousands of years ago. They have left no history, but the relics of a civilisation which puzzle the antiquary.

The *débris*, and remains of broken pottery, would indicate that this city covered an area of about ten miles, but of all the houses which formed the city the shadow of but one remains. It seems to have been a citadel or granary, as it is situated near the centre of the city. It was built of mud pressed in moulds and dried in the sun, and was composed of many small apartments, none of them very high. Five rows of joists may yet be counted, indicating five storeys; and from the fact that they are all burnt off to the wall, this house seems to have been destroyed by fire. About ten years ago I extricated one of the joists from the wall, and placed it in the Smithsonian Institution at Washington; it bears evidence of having been cut with a stone axe.

The city which formerly existed here was furnished with water by a canal from the Gila River, which also irrigated a valley of land now desolate. The remains of the canal indicate a width of 10 yards and a depth of 4.

As to the former inhabitants and their history, all is left to conjecture. We know nothing of their origin, their manner of life, their politics or religion, of their loves or hate, of their morality or their immorality. The only monument of their existence left upon earth stands there, in the solitude of the desert, as mysterious, as silent, as unreadable, as the Egyptian Sphynx.

One hundred miles south of this monument of a perished race stands another monument of another civilisation. It is the Mission Church of San Xavier del Bac, erected by the Jesuits A.D. 1668. In the dim mirage of the desert these architectural sentinels stand confronting each other. The first represents the shadowy past, the second the epoch of Christian civilisation. The latter would be an ornament to any city in Europe or America.

The weary emigrant, who has made his perilous journey across the North American continent in search of the land of gold, is surprised as he emerges from the forest to behold a specimen of Saracenic architecture, with dome and tower, and fancifully decorated façade. It appeared to me a magical creation, as it stood in bold relief against the western sun; and, marvel of architecture as it is, in this remote place, the impression is heightened when you enter the sanctuary, and hear the same vespers chanted which follow the setting sun from Rome around the world. The mission is surrounded by Indians of the Pima tribe, called, on account of their baptism, Papagos. They number some 6000, and inhabit the arid region between the Santa Cruz river and the Colorado of the West.

In the archives of the Society of Jesus may be found an interesting account of the wanderings of Father Kino in this mysterious country. The Jesuits followed up these explorations by establishing missions among the natives, many of which remain to the present day in a somewhat dilapidated condition. The avarice and tyranny of the Spaniards, who were engaged in mining in the vicinity of the missions, exasperated the Indians to revolt, and in 1680 the Apaches commenced a war of extermination. The wily Jesuits gave it in charge to their neophytes to preserve the sacred buildings, and assured their converts, with the sublime faith of their Order, that as sure as the sun shone, water ran, and grass grew, they would one day return and resume their sacred duties.

It was one of the strange episodes of life, that during my service of Superintendent of Indian Affairs for Arizona, under the Government of the United States, it was my fortune to reinstall the Fathers of the Society of Jesus in their ancient mission of San Xavier del Bac. The Indians received them with firing of rockets, ringing bells, strewing flowers, and every demonstration of joy.

The Colorado of the West was explored by Captain Fernando Alarçon about the middle of the sixteenth century. It was surveyed by Lieutenant Ives, under orders of the United States Government, in 1857. It is now navigated by American steamboats 500 miles from its mouth, and many thriving towns and villages are located upon its banks.

The principal Indian tribes inhabiting the Colorado are the Cocopas, the Yumas, the Mohaves, the Chemihuevis, the Hualapis, and the Yavapis. The Indians on the banks of this river number about 10,000, are a stalwart race, live upon fish, game, wild fruits, and simple productions cultivated by the overflow of the river. They worship the Great Spirit, practise polygamy, and cremate the dead. At the mouth of the Colorado River the "bore" caused by the spring tides makes a rise and fall of some 30 feet. Five hundred miles above the mouth of the Colorado occurs a phenomenon unique upon earth—it is the great gorge or cañon of the Colorado. This cañon is 217 miles long, and the walls vary in height from 4000 to 6233 feet. At the greatest elevation the width of the chasm is from 5 to 10 miles. For ages the great river has been cutting its bed down through the limestone, down through the sandstone, down into the granite. How long has it taken the attrition of the sand-bearing stream to cut its way 200 miles long and 6000 feet deep?

The bottom lands of the Colorado are very rich, and admirably adapted to the production of sugar, cotton, rice, corn, melons, and vegetables; but as the rains are not sufficient for cultivation, irrigating canals must be opened before these lands can be made productive, and then, with the fertilising waters of the Colorado, they may become as prolific as the valley of the Nile.

The Apache Indians inhabit the north-eastern portion of the territory of Arizona, roaming over portions of Colorado, Texas, New Mexico, and the adjoining Mexican States of Sonora and Chihuahua. They are estimated at about 15,000 souls. These savages have been the scourge of civilisation for more than three centuries of our history; and for ages before, from the indications of remaining fortifications, the strife existed between these robbers of the mountains and the more peaceable and industrious aborigines inhabiting the valleys. The Apaches defied the Spaniards, the Mexicans, and the Americans. With the latter they maintained a *quasi* peace, until the breaking out of the civil war in 1861, when they added the horrors of Indian outrage to the distress of internecine strife. The country lying between the Rio Grande and the Colorado was desolated by these savages. They are excellent horsemen, well skilled in the use of arms, inured to hardship and endurance. Their homes were in the mountain fastnesses, from which they sallied forth to rob and plunder the valleys. Their carnival is now over, and they are confined to reservations under charge of United States troops, and are being taught the hard lesson to work for subsistence.

The territory, generally supposed to be arid, is watered by several important streams. The Colorado has already been alluded to as being navigable 500 miles on the western boundary of the territory, and empties into the Gulf of California, called formerly the Sea of Cortez. The Gila River rises in New Mexico, and, running westerly through the territory, empties into the Colorado, opposite Fort Yuma. Salt River rises in the northern part of the territory, and empties into the Gila, near the Pima villages. The San Pedro River rises in Sonora, and empties into the Gila. The Santa Cruz River rises near the Mexican boundary, and runs in a north-westerly direction towards the Gila; but its waters are consumed in irrigation. There are many small streams, all contributing finally to the Colorado, and flowing into the Pacific waters.

The mountains are the most prominent natural features of Arizona. In the northern part of the territory the San Francisco Mountain rises to an altitude of 12,000 feet above the level of the sea. Its snowy summit is visible for a radius of 100 miles. In the southern part of the territory the Santa Rita Mountains are the most conspicuous, being about 7000 feet high. The whole country is composed of vast plains, crossed from north to south by broken ranges of mountains. The plains are covered with nutritious grasses, and the mountains are supposed to contain minerals.

The Spaniards found near the boundary line the largest masses of pure silver which have been found in the New World, and ores of gold, silver, copper, lead, and iron have been discovered in many localities. Rock salt of a pure quality is found in the mountains, and the lagoons bordering the Gulf of California furnish an inexhaustible supply of this necessary, thrown up by the tides and purified by the sun.

The indigenous trees of Arizona differ materially from the American forest growth. The Mesquite-tree, an acacia, grows in the lower altitudes, and produces an annual crop of beans, which are very nutritious for animals, and used by the Indians for making bread, and also for making whisky. A prolific mesquite-tree will yield 10 bushels of beans annually. The *Cereus giganteus* is the most singular of the forest growth. This tree sometimes rises to a height of 50 feet without limb or leaf. It has a columnar, fluted body, covered with thorns, and bears a fruit at the crown, which the Indians gather when ripe, expressing the juice for molasses, and making the pulp into a cake of bread for the winter. The river-bottoms are lined with cotton woods, and the mountains bear an abundant growth of live oak and yellow pine. Wild hemp, the sunflower, and the poppy, attest the generosity of the soil and the geniality of the climate.

The American aloe, or maguey plant, grows in great abundance on the hill-sides and mountains, and is an important natural production. The head is formed in leaves like the artichoke, and grows to the size of a cabbage, being protected by sharp bayonet-like shoots 8 to 10 feet high. These being cut away with long knives, the Indians and Mexicans gather the head and utilise it in various ways. If roasted it makes excellent food, something like a roasted pumpkin, but more astringent. It may be boiled down to a syrup and form a saccharine feast; but the highest delight of the natives is to manufacture this mountain luxury into an intoxicating drink called "mescal." This is done in a primitive way, by fermenting the mashed head of the maguey in a raw hide, stretched on poles in the sun, and distilling the juice in a rude alembic. The extract has very much the appearance and flavour of Scotch whisky, and has consoled many a weary traveller in that region besides myself. The fibre is manufactured into ropes, mats, carpets, and saddle blankets. A green tree, producing a pleasant and nutritious pea, grows in the low lands.

The indigenous potato, or "comote," is found on the mountain sides in its native coarseness. Even in the desert a food is produced from a parasite *classed as* "Ammabroma Sonorea," or the sand-food of Sonora, which resembles the sweet-potato in shape and flavour. Amole, the native soap-plant, is a curious natural production, and is used by the natives for the laundry; it washes flannels without causing shrinking, and is considered a great preservative of the hair, making it as glossy as if oiled. The cactus in many varieties is found in all parts of the territory, and botanists will discover in this remote region many rare and unknown productions.

The fruits grown in the territory are apples, peaches, apricots, oranges, figs, grapes, pomegranates, pears, lemons, and quinces. On account of the open plains, and absence of dense forests, wild game is not so abundant in Arizona as other territories of Western America, and the rivers furnish a very small quantity or variety of fish. The buffalo does not roam so far west as Arizona. The principal game is bear, deer, antelopes, hares, wild turkeys, and the peculiar top-knot quail. The Mexican paysano, or road-runner, flits continually before the hunter, and furnishes stories for the ignorant by his supposed aptitude in killing snakes. The reptile family are abundant, and grow to a large size, the rattlesnake furnishing the greatest variety. The escupion, or Mexican spitter, is regarded by the superstitious natives as poisonous, but an examination of its fangs has proved it entirely harmless. Tarantulas of the largest size are found in Arizona, and the centipede is frequently a more familiar than welcome bed-fellow. Lizards, scorpions, alicrans, horned frogs, and such diminutive reptiles, may be found in interesting variety.

The first exploration of the territory of Arizona, after its acquisition by the United States, was made by a company, under my command, in 1856. After a weary march of 1500 miles, through hostile Indian tribes, we established head-quarters at Tubac, on the Santa Cruz River, and planted in this far-off wilderness the germs of Western civilisation. The nearest military post was a hundred leagues, and a mail from Washington did not reach this remote outpost in less than 60 days. At the present day we are in telegraphic communication with the principal towns in the territory, and United States mails are distributed with celerity and safety to all prominent points. Daily and weekly newspapers are published in the principal towns.

A railway is projected and in course of construction across the continent, on the 32nd parallel, which will pass through the territory, and bring it into more intimate relations with the rest of the world.

The territorial capital and seat of the supreme court is Tucson, a town south of the Gila, containing a population of 3500. The most important town north of the Gila is Prescott, named after the historian of Mexico. This town is beautifully located in the lap of the mountains, is the head-quarters of the military department, and contains a population of 1200 souls.

The population of the territory may be estimated at 50,000 Indians and 25,000 whites. The latter are principally engaged in agricultural, mining, grazing, and commercial pursuits.

The valleys, so far as they have been cultivated, have proved wonderfully productive, and with the assistance of irrigation, two crops annually can be gathered from the same soil. The agricultural productions are cotton, sugar, corn, wheat, barley, and vegetables.

In the area of 120,000 square miles of land comprised in the territorial limits, it may be safely stated that a moiety produces the most nutritious grasses all the year round, capable of sustaining millions of cattle without expense.

From the level of the sea, in latitude 31° 20′, to an altitude of 1200 feet in latitude 37° north, any desirable temperature may be obtained.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[Published May 27th, 1875.]

SESSION 1874–75.

Tenth Meeting, April 12th, 1875.

Major-General Sir HENRY C. RAWLINSON, K.C.B., President, in the Chair.

Presentations.—*Arthur M. Robinson, Esq.; George Wray, Esq.*

Elections.—*William P. Clirehugh, Esq.; Rev. William Covington,* M.A.; *Hamilton Grant Dunlop, Esq.; John Lindesay Keir, Esq.; C. Henry Lloyd, Esq.; George N. Maule, Esq.; James McMaster, Esq.; Joseph Taylor, Esq.; George F. White, Esq.*

Donations to the Library from March 22nd to April 12th, 1875.—Origin of the name "America;" by Jules Marcou, 1875 (*Author*). Jahresbericht der Commission zur wissenschaftlichen Untersuchung der deutschen Meere in Kiel, 2nd and 3rd Jahrgang, 1st Abth., 1875; Ergebnisse der Beobachtungsstationem an den deutschen Küsten, 1874, No. 3 (*The Commission*). A Military Report on the Country of Bhutan; by C. M. MacGregor, 1873 (*Author*). Geological Survey of Canada; Report of progress for 1873-74, with Map showing the Townships surveyed in Manitoba and N.W. Territory, Canada, 1874, and Sketch Survey of the Saskatchewan River (*F. Killam, Esq. and A. R. C. Selwyn, Esq.*). Vocabulary of Dialects spoken in the Nicobar and Andaman Isles, &c.; by F. A. de Röepstorff, 1875 (*Author*). Fiji and the Fijians, by T. Williams; 3rd edition, 1870 (*J. S. Phené, Esq.*, LL.D.). Om de kulförende Dannelser paa Öen Disko, &c.; by K. J. V. Steenstrup, 1874 (*Author*). Report of the Chief Engineer of Public Works on the Navigation of the River St. Lawrence between Lake Ontario and Montreal, 1875 (*Foreign*

Office). The Book of Ser Marco Polo, 2nd edition, 1875; by Colonel Henry Yule (*Author*). Letter de Jean Bernouilli à Jean Jacques de Mairan (*Albert Müller, Esq.*) Selections from the Records of the Madras Government, No. XL. (*H.M. Sec. State for India*); and the current issues of Corresponding Societies, &c.

DONATIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF MARCH 22ND, 1875.—A tracing of the Coast of Peru from a Spanish Chart, extending from Rio Santa to Tombez, near Guayaquil (*C. R. Markham, Secretary*). 340 Sheets of the Ordnance Survey of the British Isles, on various Scales (*through Sir H. James, Director*). 33 Sheets of MS. Maps of Pegu and Burma, showing the proposed route from Moulmein to Western China (*J. Coryton, Esq.*). 13 Sheets of Admiralty Charts (*Captain F. J. Evans, Hydrographer*). Geological Map of Cape Colony; by E. J. Dunn, Esq. (*E. Stanford*, F.R.G.S.) The Scripture Atlas, on 16 Sheets (*W. and A. K. Johnston*).

The following Papers were read:—

1.—*Journey across the Western Interior of Australia, from Murchison River to Peake Station.* By JOHN FORREST, F.R.G.S.

I HAVE the honour to report the safe arrival, at the Peake Telegraph Station, of the Exploring Expedition entrusted to my guidance, and will, as briefly as possible, give an account of our journey and route. We left Champion Bay on the 1st April, 1874, and the farthest sheep stations on the 18th; travelled north, and reached the Murchison, in lat. 26° 52′, Mount Murchison bearing north-east; followed up the river, which was well grassed, and water not very scarce, to Mount Hale, which we reached on the 2nd May; on the 4th continued up the river, which spreads out over the plains, and forms several branches; followed up first a salt-water branch, but meeting natives, were warned not to follow it, but to strike nearer north to a fresh-water river, and doing so, found the branch, which had pools of fresh water in it; and we followed it up to its source, which was extensive, well grassed, and flats lightly wooded, in lat. 25° 50′, long. 119° E. Being disappointed that the river ended so quickly, I determined to bear south-east, in order, if possible, to find a more southerly branch; we therefore turned south-east for 70 miles, passing over some very fine grassy flats, studded with very large white gums, and in some places strips of most wretched spinifex sandhill; reached lat. 26° 30′, long. 119° 40′ E., without finding any river, although all the waters run over the flats, and find their way into the Murchison. I did not care to continue further south-east, as we were getting too close to my route of 1869; and not seeing anything to make me believe that any branch was more south, determined to turn to the north-east, and try and continue in that direction to the tropic of Capricorn. On the 19th May turned north-east, and had not travelled more than 20 miles when we reached the watershed of the Murchison, which at this spot was only a low rise, with only a few gullies of water running from it. I believe the salt branch of the Murchison must turn round sharp to the south after passing Mount Hale, and probably drains Lake Austin or the marshes known to exist in that direction. On the 21st we crossed over the low watershed, and continued on north-east; and had only travelled a few miles when we entered a spinifex desert, which continued without a break worth mentioning for 60 miles, and until we reached lat. 25° 55′, long. 120° 30′. On the 2nd June we were in great want of water, and were fortunate enough to discover a most beautiful spring—an oasis in the desert—where game was very abundant, and a few thousand acres were beautifully grassed. After resting a few days, we started ahead, but after travelling 50 miles over spinifex sandhills of the worst description, without finding any water, were obliged to return to the spring, and again recruit. On the 12th my brother and Windich went to look for water, keeping to the south of east, and returned on the 13th, having been over 50 miles out, and not had a drop of water for themselves or horses during their absence. We were attacked by fifty armed natives, and were compelled to fire on them, and wounded at least two. On the 16th I went with Windich again, keeping still further south; and after travelling about 80 miles, without seeing any, on the third day were fortunate enough to find some small clay-holes, with sufficient water for four days, and returned to the spring and brought on the party. On June 22nd went with Perril, and found abundance of water in clay gulleys 30 miles off on some grassy flats, and found a small salt lake, on which there were ducks and swans; and further on found a brook running into salt marshes, in lat. 25° 41′, long. 122° 45′. On the 31st started with Windich, instructing the party to follow on our tracks on the 1st July, and continued on for four days, over most miserable country, without a blade of grass—nothing but spinifex and a little scrub. Our horses knocked up. Found a little water in short gullies running out of spinifex rises; and were overtaken by my brother and party on the 5th, in lat. 25° 32′, long. 124°, where we had only enough water to give all the horses one drink, and the only water known was 70 miles back. The view to north and north-east was most wretched, nothing but spinifex, not a hill visible; horizon being as uniform and well-defined as the sea, presenting an awful prospect. Two horses had been abandoned, being unable to travel. Failing to find any water in the neighbourhood, on the 6th returned 18 miles, and found enough water in a gully to last nearly a day, which enabled us to search the country before we retreated further. On the 7th myself and brother, with a native apiece, searched in different directions, and were fortunate enough to find sufficient water at a rocky gully to last a fortnight; on the 9th my brother and Perril went ahead in search of water; we followed: on the 11th they were successful enough to find a small spring in a springy gully with plenty of water in it, in lat. 26° 6′, long. 124° 42′. This was very fortunate, and good old feed was plentiful, in a grassy plat, the first seen for over 130 miles. The spring was surrounded by the worst description of red sandhills, covered with spinifex, which appears to extend for a great distance in every direction. We rested here on the 14th and 15th, and on the 16th I started with Windich to look for water. Country of the most wretched description to travel over; our horses knocked up; left one, and continued to search on foot. On the 18th found a pool in a rocky gully, which ran out of some rocky cliffs in the spinifex undulations, sufficient to last the party a month, in lat. 26° 2′, and long. 125° 27′. On the 19th we met the party coming on our tracks, and on the 20th reached the water with all the horses; recovered the horse I had abandoned, and brought him to camp. From this spot we could make no headway for three weeks; five times we tried in different directions, over the most fearful spinifex sandhills and plains; all the rock waterholes were dry; and we nearly killed many of our horses with the long trips without water. At last a thunderstorm came, and although it scarcely rained where we were, we thought it might have done to the north-east. Left camp with Windich on the 1st, instructing the party to follow on the 7th, and, before leaving, to bury flour and everything we could possibly do without, so as to lighten the loads for the horses. Found a little rain had fallen for the first 60 miles, but afterwards it appeared to end. On the 7th we sighted hilly country ahead, and, although our horses were nearly done up for want of water, made towards it. It was the first hilly country we had seen for many hundreds of miles. Twenty miles over high spinifex sandhills brought us to the ranges, which were beautifully grassed in the flats, but no water. Found rock-holes dry; continued on till night, and camped without water for ourselves or horses. On the 8th searched in every direction for water; horses nearly dead; found salt-water, but could not drink it. In the afternoon found granite rocks, and water in them, in several places; and towards evening found enough to last the whole party one day. Returned towards the party: met them on the 10th, and brought them to the water on the 11th, which is in lat. 25° 55′, long. 126° 50′. On the 12th went again with Windich, the party to follow on the 13th, and found a spring in the Barrow Range, which the party reached on the 14th, in lat. 26° 3′, long. 127° 23′, near which we saw Mr. Giles's horse-tracks, but he had not found or visited the spring. We were now in safety and in a good position. The country was much improved; fine ranges were visible to the east; and although spinifex was apparently without end to the north and south, still to the east, the direction we wished to go, looked very promising, and many ranges ran in that direction. On the 15th left spring with Windich, party to follow on 16th. Found water in granite rock-holes the first day. The Cavanagh Ranges looked very remarkable to the east; on the 16th reached them, and found where Mr. Giles had been camped for a long time at a most splendid spring, in lat. 26° 11′, and long. 128° E.; Mr. Gosse's track was also crossed. On the 17th the party arrived, and on the 18th we rested at the spring. On the 20th we reached Skirmish Hill of Mr. Gosse, having been obliged to abandon another horse. All the water was dried up, but we found a little by digging in the sand about a mile from his camp. On the 21st again left with Windich, the party to follow on the 22nd. Reached Tomkinson Ranges; no water at night. On the 22nd continued on; horses knocked up; left them, and went on foot: tried south, and returned to where we left our horses, late in the afternoon, without finding a drop of water. Started again on foot to the north, and had not travelled more than two miles when we discovered a fine running spring of good water; walked back, and brought our horses to it. Next day (August 23rd) party arrived; horses all knocked up, and two left behind, with 150 lbs. of flour. Windich and I started back on foot, and brought the horses to camp, which we reached by sundown. Spring is in lat. 26° 15′, long. 129° 20′. Rested here four days. On the 27th left camp again with Windich, party to follow on 28th. The first day found a spring, and another on the 28th. Returned and met the party, and took them to the water, in. lat. 26° 7′. On the 31st we all moved forward together, and found water in the Mann Ranges, in lat. 26° 3′, long. 130°. From this point we followed nearly along the homeward route of Mr. Gosse, having, however, to search for water until we got to the Musgrave

Ranges, which we reached on September 4th. After this we obtained water at many of his (Mr. Gosse's) camps. Before reaching the Musgrave Ranges we were short of water, and were obliged to abandon another horse and 150 lbs. of flour. From the Musgrave Ranges we struck the head of the Alberga, and followed it down to the telegraph line, which we reached on September 27th. On our way down the river we abandoned another horse, and had considerable difficulty in procuring water. On the 28th we travelled down the line towards the Peake Telegraph Station. On the 29th one of our horses dropped down dead, just after we had saddled him. On the 30th September we reached the Peake, where we received the greatest kindness and attention. I reported our arrival to His Excellency Governor Musgrave, and sent him a short account of our journey. The Chief Secretary has offered to assist us in any way, and we are going to avail ourselves of some assistance in the way of horses, as ours are all knocked up and scarcely able to travel. After we reached long. 127° we entered a much better country; and all through the Tomkinson and Musgrave Ranges there is a large extent of good country, but it is not very wide, and spinifex appears to extend far to the north and south. Although we have been very fortunate in being able to reach the telegraph line, I fear we have not done so much reconnaissance work as we might have done had the season been favourable. No rain worth mentioning has fallen; nor any feed, except a little of the oldest and driest description, that it is a marvel how our horses kept alive at all. We have had to walk in turns the whole way, even to the Peake; only three of the horses were able to carry a man, and they were only just able; to get them out of a slow walk was never thought of latterly. If the season had been different, even with the wretched spinifex desert through which we passed, I believe we might have been able to get farther north, but all our attempts were unavailing, and at last we were only too glad to be able to make in to Mr. Gosse's and Mr. Giles's tracks. While we stuck in lat. 26° 11′ long. 128° E., many hundreds of natives were seen, and they are very numerous even in the worst spinifex country, in which much game exists. Three times they attacked us, and we were obliged to fire on them. The first time fifty attacked us, and the third time over one hundred, but we managed to drive them off, and some were wounded; but, as far as we know, none were killed. In the last instance Windich and I were alone, and a spear came very close between us. We were out of meat, tea, and sugar, before reaching the Peake, and had been living over a month on damper and water. Health of party has been very good, and everyone conducted himself in an exemplary manner. I sincerely trust our endeavours may meet with the approval of His Excellency the Governor.

Peake Station, Oct. 3rd; and
Adelaide, Oct. 5th, 1874.

The PRESIDENT explained that the paper just read was only a very brief summary of Mr. Forrest's account of his journey. The detailed journal and map would be published in the 'Journal' of the Society. A letter had recently been received from Mr. Forrest, stating that he was on his way to England and would arrive in the month of May, bringing his journal and map with him. He had performed a very extraordinary journey under great difficulties, and, although he had not succeeded in finding any land available for sheep-runs, or other colonial purposes, he still deserved very well of the Geographical Society and of all lovers of geography, for having been the first to traverse that part of the Australian Continent. It was something, at least, to discover that the country was not available for agricultural or pastoral purposes, because that would save further attempts at explorations in quite an impracticable tract.

Sir GEORGE BOWEN (Governor of Victoria) said, as an old Fellow of the Society, he was very much gratified at finding himself once more at one of the Meetings. He had been sixteen years absent from England as Governor, first of Queensland, then of New Zealand, and now of Victoria. Victoria was the smallest in size, but the most important and richest of all the Australian colonies, having a revenue of 4,500,000*l.*, which was much larger than that of the kingdom of Portugal, twice as large as that of Denmark, three times as large as that of Saxony; a revenue, moreover, which was raised only in a small degree by taxation. It was derived chiefly from the public lands, and from the State railways and waterworks. The taxation was only about the same sum per head as in England, namely, about 2*l.* 5*s.*; and of the money actually raised by taxation one-third was spent on public education, including not only primary and secondary schools, but the University of Melbourne, and schools of mines, schools of design, schools of art, and other literary and scientific institutions. When he last had the honour of dining at the Geographical Club, and attending a meeting of the Society sixteen years ago, just before he went to Queensland, his late lamented friend, Sir Roderick Murchison, was in the Chair. He congratulated the Society on seeing the Chair now filled so ably by a statesman as well as a geographer. In the words of Virgil,

"Uno avulso non deficit alter
Aureus, et simili frondescit virga metallo."

He had never been in Western Australia, except when he touched at King George's Sound in the steamer in passing to and fro from England, but the two Messrs. Forrest dined with him at Melbourne just before he left. They were in perfect health and condition, in spite of all the hardships which they had undergone, and they were both in earnest hope of the recognition which they were now receiving from the Royal Geographical Society. The fainting heart of many an explorer in the wilds of Australia and in the deserts of Africa had been cheered by the prospect of future recognition by this Society. He had had no personal experience of the interior of Western Australia, but he was for eight years Governor of Queensland; the position of which, on the East Coast of Australia, corresponded with the position of Western Australia on the West Coast. He went to Queensland as the first Governor of the colony in 1859, and Sir Charles Nicholson (whom he was glad to see there that evening) went with him as first President of the Council. On his arrival he found the large and munificent sum of 7½*d.* in the public chest; and some thief, supposing, perhaps, that he had brought with him a sum of money to the colony, broke into the chest, and stole the 7½*d.* the first night he was there. During his eight years' administration in Queensland, that sum of 7½*d.* swelled into an annual public revenue of 800,000*l.* When Sir Charles Nicholson and himself first went to Brisbane, the only settlement between Brisbane and the Gulf of Carpentaria was Rockhampton, about 500 miles to the north of Brisbane; but, at the present time, there were settlements the whole way to Cape York, 1200 miles further to the north; and he hoped that Western Australia would similarly progress. Of course Western Australia had not the same great resources in arable land, in land fit for sugar and for cotton, and in gold-fields, which Queensland possessed; but still Western Australia might follow the example of Queensland, and he hoped that, fifteen years hence, some Governor of Western Australia would be able to give as good an account of the progress of that colony as he himself was able to give of the progress of Queensland. People must not be deterred by the unpromising appearance which the interior of Australia sometimes presented to a first explorer. There was a time when everybody said that Queensland was too hot for sheep, and now there were 11,000,000 of sheep in the colony. They must not, therefore, jump to the conclusion that, because a country appeared unpromising, sheep would not flourish there. In Queensland the flow of pastoral occupation had gone on almost like the flow of the tide. At the end of every year some 200 miles had been added to the domains of Christianity and civilization; and in the course of five or six years pastoral occupation had spread over the whole of that vast territory, three times the size of the French empire. Such were the triumphs of peaceful progress. They were triumphs in which Englishmen might well rejoice, for they were victories without pain or bloodshed. Their conquests were not over men, but over nature: not for England only, but for all the world; not for this generation simply, but for all posterity.

Mr. LEAKE (Speaker of the Legislative Council of Western Australia) said he had on the previous Saturday received a letter from Mr. John Forrest, dated from "the high seas off Bombay," in which he said, "To-morrow I hope to land there, and I am on my way to England. I shall, therefore, travel through Egypt, staying there about a week, but I hope to be in England very nearly as soon as this letter." Mr. John Forrest was a native of Western Australia, and when he arrived in this country he (Mr. Leake) hoped to be able to give him the benefit of his own three weeks' experience in England. When he heard that Mr. Forrest was so near this country, he called upon the Geographical Society to inform them of the fact, and he had hoped that it would have been his privilege and honour to introduce Mr. Forrest to the Society. The late Governor of Western Australia, his Excellency Governor Weld, now Governor of Tasmania, was a man of liberal views. It was he who had sent Mr. Forrest across South Australia from King George's Sound; and it was Governor Weld who, with the approval of the Government of Western Australia, sent this experienced explorer on his late expedition. The party started from Perth overland to Champion Bay, Mr. Forrest himself going by sea. His instructions were to examine the heads of the Murchison and the Gascoigne, and more particularly to try and discover any territory which might tend to the good of Western Australia. Forrest had done all he could to carry out his orders; but he was not able to get far north, though he had gone through nearly the very centre of Australia to the Peake Station in South Australia. He (Mr. Leake) was one of those who had the honour to receive Colonel Warburton on his return after his adventurous journey across the continent, and he had heard Colonel Warburton say that he doubted very much indeed if Forrest would ever be able to get through with horses, and that he himself would never have succeeded if it had not been for his camels. Mr. John Forrest's party consisted of himself, his brother, a farrier, a policeman, and two natives, and he made his journey through with horses, accomplishing that which Colonel

Warburton looked upon as an impossibility. He (Mr. Leake) had had the pleasure of knowing most of the explorers in Australia. He had known the Gregorys, Mr. Austin, Colonel Warburton, Sir George Grey, and others. When John Forrest arrived in South Australia he received an ovation that had scarcely been equalled even by that which was given in that loyal colony to royalty. He was met by more than 20,000 people. He was fêted in every way. Theatres were under the distinguished patronage of Mr. John Forrest, and foundation stones were laid by Mr. John Forrest; but John Forrest remained John Forrest still. He returned to Western Australia the same kindly, humble-minded man that he left it. The Geographical Society would find that John Forrest was a cool, practical adventurer, whom they would do themselves good to honour. The Society had given Colonel Warburton its gold medal; and before he left England he trusted that John Forrest would also receive the gold medal.

A Fellow asked how the natives managed to live in the country through which Mr. Forrest had travelled?

The President said that the natives existed in exactly the same way as Mr. Forrest and Colonel Warburton existed, but they were acquainted with the water which European travellers had to discover by accident. Undoubtedly there was water in the country in small quantities, and at considerable intervals, and in secluded spots. The natives were acquainted with those spots, but such travellers as Mr. Forrest and Colonel Warburton had to find them out for themselves. Colonel Warburton had stated that by following the tracks of the natives he was frequently enabled to find water, and there could be no doubt that Mr. Forrest had adopted the same plan. The southern part of Western Australia was being sporadically colonised as there were found certain portions available for colonisation. It was not known whether similar spots existed farther to the north. He hoped that during the present session the Society would have the advantage of seeing Mr. Forrest, and hearing from him personally the results of his own observations in the country.

2.—*Journey from the Pangani, viâ Wadigo, to Mombasa.*

By the Rev. Charles New.

Mombasa, East Africa,
Sept. 3, 1874.

Since my return to Eastern Africa I have accomplished a journey from the River Pangani through Usambara onwards, by way of the Wasegeju and Wadigo, to Mombasa, and I have a few notes thereon which I think it may be worth while to communicate.

Vuga has been visited before by Krapf, Erhardt, and, more lately, by Allington: Burton and Speke made their way in company to the outskirts of the Usambara country. Most of these gentlemen having written something upon the subject, I may not have anything very new to say; but I think it may, nevertheless, be worth while to remind you, particularly at this time, that there is such a country in existence. If East Africa is to become a free country, every foot of land, especially near the coast, will acquire a value hitherto unknown, but Usambara possesses many characteristics which will make it particularly important.

The Pangani is a large body of water. The banks are low, but, judging from the abundant vegetation, very fertile. The Arabs and Wasuahili are cultivating them on both sides, and, of course, by slave-labour. Upon these productive districts I fear the Arabs, finding they cannot get slaves at Zanzibar, Pemba, &c., will come and establish themselves. Here there is nothing to prevent them getting any number of slaves; so that the effect of the late treaty with the Sultan of Zanzibar will be just to remove slavery from one place to another, from the islands to the mainland. I cannot help thinking that if slavery itself be not rooted out, the above result, with very disastrous consequences, will take place very largely.

The Pangani cannot be ascended above Tongue on account of falls, which are reported as being very fine and the roar of whose waters at the distance of a couple of miles, I can testify, falls like low thunder upon the ear.

Two marches from Tongue brought us to the south-western foot of the Usambara hills; the Ruvu, as I must now call the river, being very near on the left. Beyond this the river splits up into many parts, forming a kind of irregular chain-work, a number of small islands being the result. Upon these islands the Wasegua have built their villages, thus securing themselves against the attacks of the Masai, who, bold as they are, hesitate to pursue their prey across deep water; and numerous as the divisions in the river are about here, they, nevertheless, form deep moats, or rush by in broad, strong, and really dangerous torrents, sometimes surrounding the villages two and three-fold.

The Wasegua are a numerous, interesting, and well-to-do people, following both pastoral and agricultural pursuits. The semi-civilization of the coast has had much more influence upon them than upon the Wanika, for instance, and their original garb and arms have been thrown aside for the dress and musket of the Wasuahili. The presence, too, of an abundant supply of water seems to have suggested to them the propriety of washing themselves and clothes, so that, for East Africa, they are clean people. But we must not be hard upon the less clean, for it frequently happens that in such cases there is a scarcity of water, and the people therefore use oil as a substitute.

The Wasegua occupy the district lying between the coast people and the Ruvu on the one hand, and the Wasagara and Wanugú on the other.

On our sixth stage (they were short ones) from Tongue we reached Makuyuni (Among the Sycamores). Here we halted, in order to send messengers to the chiefs Samboja and Kimweri, and to inform them of our desire to visit them.

On the third day after we heard from Samboja, to the effect that he would meet us at Mombo, a village about midway between Vuga and his own residence, for maneno (palaver).

Complying with this arrangement, we proceeded to Mombo, and found Samboja seated outside a poorly stockaded village, beneath a large tamarind-tree, and surrounded by about 300 of the wildest-looking fellows I ever saw; every man armed with a flint-musket, and most with a sword of some sort.

I was surprised to find Samboja in appearance and dress an Arab; with white kanzu, black surtout braided over the shoulders with tinsel, coloured girdle and turban, sword and dagger mounted in silver, an oblong case of silver like a large snuff-box, and stuffed with charms, at his breast, he presented a great contrast to his poorly-clad brigand-like followers. I expected to have met a tall, fine, black, shaggy, fierce, lion-like sort of man; yet here was a short, stooping, yellow, haggard, tame-looking fellow, not at all imposing or impressive at first sight. But I soon found that, with a high nervous temperament, he was sharp, short, active, energetic, and resolute. I told him my errand, whereupon he said in substance:—"Very well. But you can't go to Vuga; you can't see Kimweri, my son; you *may* follow me to Masinde. Give me any present you have for the King, and I will then see you safe out of the country." This was said with a cool decision which I could not mistake. I saw he was afraid that, having come to him through one portion of his foes, I might have some secret understanding with them. I yielded to him for the time, and went to Masinde, situate upon the north-west slopes of the mountains. The end of this was that I was enabled to disabuse Samboja of all suspicion, and he consented to do my utmost wish.

The way to Vuga from Masinde was in a backward course S.E., and the march between the two places turned out to be a very hard day's work. Midway between the places we faced the mountain's side and began the ascent. It was extremely stiff climbing, and for the men and their loads it was cruel work. Up, up, up, then down and up, for three hours, we at length approached Vuga; but, instead of being led into the town, were taken round to a small kraal on the other side of it, and told that *that* was to be our place of abode.

Vuga is built upon the very top of a rounded peak, some 4700 feet, by aneroid barometer, above the level of the sea. It comprises between two and three hundred small cone-shaped huts, plastered with mud within and thatched without, but room for them all is only found by hewing out ledges from the sides of the peak. The town is entirely without defences, except those of a natural kind. Valleys drop to great depths on all sides of it, and it can only be reached by the steepest acclivities. The prospect it commands is very fine. There are mountain peaks, the loftiest of which cannot be less than 7000 feet above the sea-level: these present every variety of shape; there are ridges upon ridges, rising one above another till lost in the clouds; there are rocks and crags and "threatening steeps" *ad infinitum;* there are enormous valleys, gloomy ravines, and glens as romantic as Glencoe; there are dark majestic forests, compact woods, wildernesses of brown jungle, expanses of tall, waving grass, beautiful slopes of short, green turf, and everywhere patches of cultivated land, fresh and verdant as an Eden; brooks, and streams, and torrents trickle and murmur, tumble and splash and roar on all sides. The morning-dawns are often gloomy, but are sometimes very fine, particularly from the elevated spots when the clouds and mists are below you, lit up by the sun, and rolled by the wind in all manner of fantastic shapes; the sunsets are often gorgeous, and the play of colour, light, and shade upon clouds, mountains, and valleys, such as no pen could describe or brush depict. Such is the kind of scenery which passes before the eye, as in a grand panorama, during the course of a single day's ramble among the mountains of Usambara. Justice has not been done to this south-eastern Abyssinia, and I cannot hope to do more than just call attention to some of its leading features and really remarkable beauty.

Among the picturesque beauties of the neighbourhood of Usambara perhaps I ought to mention the presence of a lake at a short day's march north-west of Masinde. From the accounts of the natives it is about nine miles in length and one-third, or less than one-third of that in breadth. I saw it both from Masinde and from the heights of Vuga. I had never heard of this lake before. It is called Mangu. It derives its waters from the north-western portion of Usambara Mountains, and sends off its surplus by the Mkomazi into the Ruvu.

The soil in the neighbourhood of Vuga, and indeed almost everywhere, is a deep red; and the rocks—cropping out of the mountain sides, crowning the highest peaks, and lying in the beds of most torrents—are granitic and quartzose. But the stream, taking its course round the north side of Vuga, flows over beds of sandstone. Coal is said to have been sent from Usambara to Zanzibar, but, though I tried hard, I did not succeed in obtaining a specimen. The natives brought me charcoal, bearing evidence, however, of its having been dug from beneath the surface. They insisted, however, that *boná fide* steam-ship coal, as they called it, from the assurances of the Wasuahili, did exist in their country. The soil is evidently very fertile, and from the constant accumulation of clouds and frequent rains never suffers from drought. Almost anything might be raised here. A basket of fine ginger was sent me by the king: it grows wild, and the natives cultivate it for their own use. At present plantains and Indian corn are the staple articles cultivated and consumed by the Wasambara. The coco-nut palm they will not cultivate, on account of a superstitious belief that wherever that useful tree is planted their enemies will prevail.

The climate during my stay at Vuga, with the exception now and then of a few hours at midday, was delightfully cool, the temperature being below the malaria-generating point; so that I should say the country presents all the advantages of a sanatarium to the future civilisers of East Africa. Sometimes we had the bright, clear, cool, early spring weather of home; but sometimes it was more like our September.

The population of Usambara is not large, and appears to be becoming less and less. The country is in a far less flourishing state in this respect than it was at the time of Dr. Krapf's visit. This is owing to the intestine feuds which have rent the people into factions ever since the death of Kimweri the Great. Almost every son of the old man—and he had many—seems to have thought his claim to succeed his father equally good; each managed to secure some friends and supporters, so, throwing themselves headlong at each other, they have dashed themselves to pieces. Evidences of more flourishing days, larger population and considerable possessions in herds and flocks, meet you everywhere—in vacant villages, in wildernesses that once were plantations, and in broad, well-made paths, judiciously carried round instead of over the mountains, now wholly neglected and altogether impassable. The people of former days, as compared with those of the present time, were not only more numerous and well-to-do, but they were much more clever, enterprising, and energetic. War has had not a little to do in producing this result. But, to go further, the supposed advantages of war have been its perpetuation. No doubt love of victory and love of power are elements in this case; but love of money—greed of gain—has not been a minor consideration. Well, in almost every battle some will be taken prisoners, and the existence of *slavery* upon the coast makes these a valuable acquisition. They can be sold—turned into ready money—whatever the people care for most; so that *slavery* has not a little to do, even from this standpoint, with the continuance of these quarrels which have so long torn Africa to pieces.

The present people of Usambara may be said to comprise three distinct tribes or races. The Wakilinde, who are the ruling section; the Wambugu, who look more like naturalised subjects from other parts; and the Wasambara themselves, who are the aborigines. The Wakilinde appear to me to be of Arab origin, their forefathers having obtained supremacy at an early period. The Wambugu look not unlike degenerate Wakuavi, who, driven to Usambara for refuge by their foes, have, in the course of time, lost their language, and become assimilated to the people with whom they are living, in everything but an unalterable physique and a few incorrigible manners and customs. The Wasambara are just what you would expect to find the aborigines of such a country to be. Kimweri claimed relationship with the people of Chaga, and this would rather support than militate against my theory. The two peoples are in many respects very similar; for instance, in their love of hills, in their form of government, and in their physical conformation. These, however, are only suggestions rather than authoritative data upon the subject.

After a stay of more than a week at Vuga, during which time I was treated with the most generous hospitality by the young king Kimweri, whose chief request in return was that I would obtain for him about a score of cannon and a number of men to make gunpowder for him, I took my leave of the place. I cut across the mountains in a north-easterly direction, passed up fine valleys more than 4000 feet above the level of the sea, ascended ridges and peaks more than 6000 feet in height, and descended to the plain on the northern side of the block. We were five days in doing this, and though we did not travel all day, such was the severity of the task that my men, who were not novices in African travel, said they were never so worn out in their lives.

Our way now ran in a somewhat out-of-the-way course, at first towards Buiti, in the country of the Wasegeju, then in a direct line through the low lands of the Wadigo to Mombasa, which we reached in forty-five days after our departure from Zanzibar.

Colonel GRANT said he knew Mr. New personally, and was sure the Society would miss very much the admirable remarks that he was accustomed to send home. He was the only person who had ever ascended as far as the perpetual snows on Kilima-Njaro, and his recent journey was a very interesting one, as it showed that there was a very fertile region in that part of Africa, and also that there was a great field for missionaries. He hoped that some one would be found to succeed him who would be able do as much as Mr. New had in the way of extending geographical knowledge. Mr. Wakefield, who was still at Mombas, was also a great geographer. He had been longer in the country than Mr. New, and was equally well acquainted with the languages. He, too, had on several occasions sent home accounts of routes that he had learned from natives who had been far to the westward; and these routes had been published in the 'Journal' of the Society, forming very valuable additions to the geographical knowledge of that part of the world.

THE PRESIDENT read the following letter that had been received from the Rev. Mr. Wakefield on the subject Mr. New's death:—

"MY DEAR MR. BATES, Rîbe, East Africa, March 11th, 1875.

"I have very sad news: poor Mr. New is dead! He died in Durûma, only a short distance from here, on the 14th of last month, on his way from Chága to the coast. He seems to have had a very severe and prolonged attack of dysentery. The journey, too, was evidently very harassing and fatiguing. I was quite shocked when I first heard the news of his illness, for he wrote me a note only a few hours before he died; and I did not know that he was anywhere in the neighbourhood. I hastened at once to his relief, with medicine, wine, provisions, &c., but only in time to bring the corpse to the station for burial.

"His notes, instruments, and other property, have all come safely to hand.

"I wish I could write you more largely, but it is midnight, and I am wearied out with writing letters on this sad subject.

"In haste, believe me very sincerely yours,
"THOMAS WAKEFELD."

The PRESIDENT added that the route that Mr. New followed from the coast to Vuga, the chief town of Usambara, was very much the same as that followed by Burton and Speke in 1857; but the continuation of the route to Mombas was through an entirely new country.

Mr. HUTCHINSON, after remarking that the route from Vuga to Mombasa had, he thought, been traversed by Dr. Krapf, said that the Church Missionary Society, with which he was connected, had a mission at Kisulidini, and on Sunday, the 14th of February, a letter was brought in to the missionary, Mr. Price, from Mr. New, stating that he was returning from the Chaga country, and was in a very weak state, suffering from fever, diarrhœa, and dysentery, and asking for help. Provisions and a palanquin were instantly sent to him, but he was dead before they reached him. The Mission was established by Dr. Krapf, on his return to Africa in 1865, and very much had been looked for from the explorations of Mr. New, who had been endeavouring to penetrate to Kilima-Njaro; one of his objects being to ascertain if there were in the uplands of the Chaga country any places that might be used as sanataria. His effects were being brought home to England by two missionaries, one of whom was Mr. Rebmann, who, with Dr. Krapf, had discovered Kilima-Njaro.

The PRESIDENT expressed the deep sympathy of the meeting with Mr. New's family, with the Missionary Society to which he belonged, and with the Geographical world at large, in the great loss that had been sustained by Mr. New's untimely death. He promised to be a most useful member of the Missionary Society and an ornament to the Geographical Society, of which he had lately been made an honorary member.

The PRESIDENT then read the following communication from Colonel Gordon, of the Egyptian Expedition in Central Africa:—

3.—*Report on the Nile above Gondokoro between Regiaf and Dufli.* By J. KEMP, of the Egyptian Expedition under Colonel GORDON.

1. *Regiaf to Kya River,* 42 *miles.*—Country open, rocky and undulating, intersected by many mountain-streams. Many large trees.

It is thickly populated by the Bari tribe, who cultivate it to a large extent, and own large herds of cattle, which they object to sell.

The 1st cataract is 12 miles from Regiaf.

The 2nd one we saw at the mouth of the Kya River.

2. *Kya River.*—The Kya is a good-sized river flowing from the west. The Arabs and natives say it rises in the Kuku Mountains. Width about 70 to 80 yards; depth in dry season, 3 to 4 feet; in rainy season, 10 to 12 in parts. Five miles from where it joins the Nile is a fall 50 or 60 feet high. Up to this the bed is very rocky, and the banks are steep and covered with large rocks. Beyond that the country gets flat, but the river is still rocky as far as we were able to see.

3. *Kya to Dufli,* 92 *miles.*—After leaving the Kya River the country is much the same as on the north of it, but more undulating and rocky, and with fewer streams.

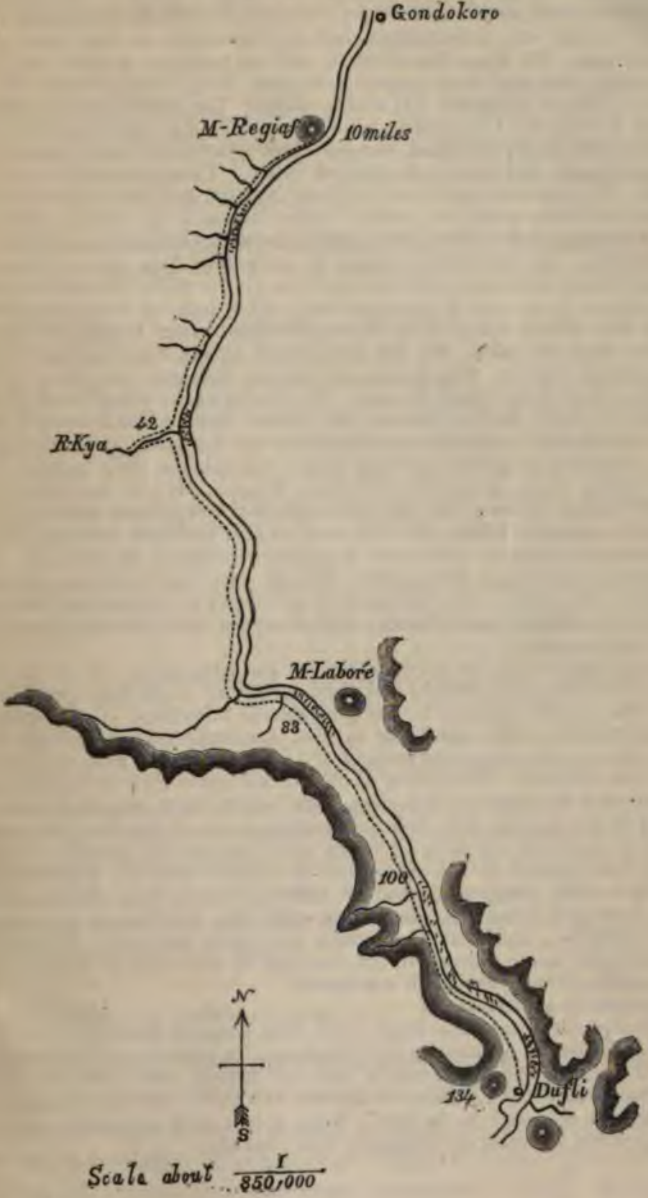
Forty miles from the Kya we came to Mount Labore on the east bank.

Twenty miles further on, another range of hills shelved down to the Nile on the east bank. On the west side the Kuku hills, which had been drawing nearer to the river, were now parallel with and only a few miles distant from it. From this point the mountains on both sides of the river run parallel with it to the head of the cataracts, a distance of about 30 miles.

The range on the east bank runs right down to the river, that on the west is separated from it by a narrow strip of land covered with high grass and prickly trees, very rocky, uninhabited, and uncultivated. The natives say there is only one path.

4. *Dufli.*—At Dufli the hills on both banks drop abruptly. From the first view of the Nile, on coming out of the high grass, there is little doubt that the cataracts are passed. As far as one can see, there extends a flat barren-looking country, covered with palms and a few other larger trees.

Sketch Map of Route from Gondokoro to Dufli, by J. Kemp, Esq.
September—October, 1874.



The PRESIDENT added that Mr. Kemp had been engaged in superintending the conveyance of sections of two vessels past these obstructions, and in putting them together at Dufli, whence it was supposed the river would be navigable up to its outlet from Albert Nyanza. The latest intelligence from Colonel Gordon was, unfortunately, not so encouraging as that received in January last. Mr. Kemp had fallen ill, and was preparing to leave for Cairo. Mr. Linant, who had been preparing to visit King Mtesa, by way of the Somerset Nile, in a steamer, was also invalided. The young engineer officers, Messrs. Watson and Chippendale, were also both ill, and had been obliged to descend from Regiaf to Colonel Gordon's head-quarters at Lardo; happily, at the latest dates, they were both reported better. These untoward events had delayed the projected expedition to Albert Nyanza, and Colonel Gordon considered that there would be a risk of further illness to the young officers in such a journey, as he believed the country between Ibrahimeya and the lake was marshy. But the Society might be quite sure, from what it knew of Colonel Gordon's character, that he would not give in unless he was absolutely compelled to do so; and it appeared, from a letter from his brother to Colonel Grant, that if other means failed, he was determined to go himself and launch his boat upon the lake. He had been joined by Mr. Marno, of the Vienna Geographical Society, who knows the country well, and was going to the western side of Lake Albert Nyanza. Mr. Marno was an experienced African traveller, so that his co-operation with Colonel Gordon would be very valuable. An African exploring expedition was on the point of starting from Italy, intending to proceed to Shoa, thence through the Galla country, and past Mount Kenia, towards the Victoria Nyanza. It was an exceedingly difficult line of country, but the promoters of the expedition were very confident of success. Within the last week an offer had been received from a gentleman attached to one of the Egyptian expeditions to Dafur, to communicate to the Royal Geographical Society such information as he could obtain on the route. The prospects of geography in Africa were, therefore, very encouraging, so many different exploratory parties all converging upon the great Lake region.

Colonel GRANT said no previous traveller had been up the side of the river which Mr. Kemp had visited; and the discovery of a new river upon the left bank was a fresh addition to the geographical knowledge of the country. Colonel Gordon, in his last letter to him, mentioned that he had met with great difficulty in getting the sections of his boat up to the west of the river above the cataracts. The natives would not sell any of their cattle, nor assist in conveying the boat up the river. He had, however, organised a corps of coolies for the purpose, and, with their assistance, hoped that Mr. Chippendale would be exploring the Albert Nyanza within the next six months. Several deaths had occurred in his camp; and he himself, with his assistants, Mr. Watson and Mr. Chippendale, had all suffered severely from affection of the liver, fever and dysentery. It was reported that Mr. Watson was coming home invalided, and that Chippendale had quite recovered. He had the utmost confidence in Colonel Gordon, and had no doubt that he would succeed in his undertaking if his health was spared.

In answer to a question,

The PRESIDENT said the latest news from Cameron was dated May 19th, 1874. The Sultan of Zanzibar had withdrawn his protection of Unyanyembe, and the native chiefs, Mirambo and his friends, were now paramount. Whether that would facilitate or obstruct the traffic between the coast and Tanganyika remained to be seen. Some people were of opinion that the change would be rather advantageous than otherwise.

Eleventh Meeting, April 26th, 1875.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*A. R. de Beaumont, Esq.; N. B. Dennys, Esq.; Oscar Dickson, Esq.; Charles Ebden, Esq.*, B.A.; *Charles Walter Everard, Esq.; James Grignon, Esq.* (H.M. Consul at Riga); *Joseph Howard, Esq.; Lord Inverurie; Robert Jardine, Esq.; A. Johnston, Esq.; J. S. Lister, Esq.; Rev. P. F. Swann*, M.A.

PRESENTATIONS.—*A. W. Sadgrove, Esq.; J. A. Skertchly, Esq.; Capt. J. G. Shanks.*

DONATIONS TO THE LIBRARY, APRIL 13TH to 26TH, 1875.—The Thermal Paths to the Pole, &c.; by Silas Bent, 1872 (*M. S. Fife, Esq*). Rejang Manuscripts on Bamboo; by J. Park Harrison, 1875 (*Author*). Report of the Permanent Committee of the first Meteorological Congress at Vienna for the year 1874 (*The Meteorological Committee*). Selections from the Records of the Bombay Government; No. CXLVI., new series (*The India Office*). Rotomahana, and the Boiling Springs of New Zealand: photographic views, by D. L. Mundy, with notes by F. von Hochstetter, 1875 (*D. L. Mundy, Esq.*). Publications of the Cracow Physiographical Society, vols. 2–8 (1868–74), and 'Wykaz zdrojowisk Lekarskich Galicyi i Bukowiny'; by T. Zebrawski, 1862 (*The Society*). The Armed Strength of Denmark; by Captain W. S. Cooke, 1874 (*The Topographical Branch, Quarter-Master General's Department*). Statistics of Friendly Societies for 1873; Victoria, 1874 (*The Australian Government*). And the current issues of corresponding Societies, &c.

DONATIONS TO THE MAP-ROOM SINCE THE LAST COUNCIL MEETING OF APRIL 12TH, 1875.—47 sheets of the Survey of India (*Her Majesty's Secretary of State for India, in Council*). 24 sheets of the Ordnance Survey, on various scales (*through Sir Henry James*, R.E., Director). 10 sheets of the Topographical Atlas of Denmark (through *the Danish Minister, General J. de Bulow*).

The following paper was read:—

Travels in Great Tibet, and Trade between Tibet and Bengal. By C. R. MARKHAM, C.B., F.R.S., Secretary R.G.S.

OF all the regions which remain to be explored, and fully brought to the knowledge of geographers, that of Great Tibet is among the least known and the most important. Until to-night no account of this region, derived from the personal observation of an actual traveller, has been submitted to a Meeting of this Society, with the single exception of that of the Pundit who was sent by Colonel Montgomerie to Lhasa in 1865. It is indeed to that distinguished officer that we owe all our recent knowledge of Great Tibet; and one of the main objects of the present paper is to furnish some account of two more recent journeys which have been made in Tibet by Colonel Montgomerie's emissaries. But I am also able to bring to your notice the work of two Englishmen who explored portions of Great Tibet many years ago. The results of their labours have remained hidden in forgotten manuscripts until now; and as no European has since followed exactly in their footsteps, and they are consequently still the most recent European explorers of this region, their narratives continue to be as valuable and as interesting as if they had been written this year. The first of these forgotten explorers is Mr. George Bogle, who was sent by Warren Hastings to the Court of the Teshu Lama just a century ago. The second is Mr. Thomas Manning, a private traveller, who reached Tibet in 1812, and is the only Englishman who has ever visited its capital—Lhasa. Bogle and Manning are the only two Englishmen who have ever crossed the Tsampu.

It is necessary that I should first define the limits of the region to which the name of Great or Central Tibet applies. Our general knowledge of that country is still derived from the work of Du Halde and from the old maps of D'Anville, published 130 years ago, and based upon the famous survey of the Chinese Empire undertaken in the reign of Kang-hi, and commenced in 1708. Tibet was surveyed by two Lamas, who had been instructed and trained by Père Regis and other Jesuits at Peking. Their map extended from Sining to the source of the Ganges, and, when it was delivered into the hands of the Jesuit missionaries at Peking in 1717, it was found sufficiently accurate and consistent to enable them to construct from it a map of Tibet, from which D'Anville compiled those which still form the basis of modern delineations of the country.

But although the survey of Tibet was executed by native Lamas, the country was visited by Jesuit missionaries in the seventeenth and eighteenth centuries. In 1661 Fathers Grueber and Dorville set out from Peking, and reached Lhasa after a perilous journey of six months, and they eventually crossed a formidable pass into Nepal, and arrived safely at Agra. It is said also, that two other missionaries, named Hippolito Desideri and Manoel Freyre, set out from Goa in 1714, and reached Lhasa two years afterwards. But their narrative, after leaving Ladak, breaks off abruptly. Father Horazio de la Penna, with eleven companions, has, however, a stronger claim to be remembered. He went from Peking to Lhasa in about 1717, at the very time when the Lama surveyors were at work; and, after remaining 30 years in Tibet, he died at Patan in Nepal, in 1747. The results of his labours, including much historical information, were published at Rome by Father Georgi, in 1762, including a Tibetan grammar; and this is the only source from which we derive some knowledge of the succession of the early Kings of Tibet.

It is from these, and less accessible Chinese sources, that Klaproth, Csoma de Körös, Hodson, and Henry Strachey, were enabled to define the limits and political divisions, and to give us a general idea of the topography of Tibet.

This most interesting region consists of the elevated plateau in rear of the first great chain of the Himalayas, which overhang the the Gangetic Valley; and Central or Great Tibet is that portion which is watered by the Tsampu, or the Brahmaputra in its upper course, and its tributaries. Tibet is divided into four great provinces; namely Kam, or Eastern Tibet, of which we know little or nothing, but which is believed to be cut up into deep gorges by the upper courses of the Yang-tse, the Cambodia, the Salwén, and the Irrawadi; *Ari*, or Western Tibet, which has been pretty thoroughly explored by our surveying parties; and the two provinces of *U* and *Tsang*, called *Utsang*, which form Great Tibet. The latter region is bounded on the west by the Marian-la, and the mighty Kailas or Gaugdisri Mountain overlooking the sources of the Ganges and the Sutlej; on the south by the outer range of the Himalayas facing the Gangetic Valley, and containing the loftiest peaks in the world; and on the north by another lofty range, called by Hodgson the *Nyenchhen-thánglá* chain, which separates the country of villages and cultivation from the nomadic hordes on the still loftier plateau of lacustrine drainage between that chain and the Kuen-lun. The eastern boundary of *Utsang*, or Great Tibet, is not so clear. It can be ascertained by a scrutiny of the lists of towns given by Klaproth and D'Anville as situated in the provinces of Tsang and U, and of Kam or Eastern Tibet respectively, and by drawing a line of separation between them. Such a line places the eastern boundary of Great Tibet along the River Kenpu or Dihong, and includes the whole course of the Tsampu or Brahmaputra above the outer Himalayas within it. Great Tibet, or the two provinces of *U* and *Tsang*, thus has an extent of about 750 by 250 miles, and is a region the *inhabited parts of* which are from 10,000 to 14,000 feet above the sea, bounded by lofty ranges to the north and south, with an inner range traversing it, and separating the watershed of the Ganges from that of the Sampu. It thus has two systems of drainage. The Sampu, or Brahmaputra, traverses the whole region from west to east, and receives tributaries from the Nyenchhen-thánglá Range on the north, and the northern slopes of the Himalayan outer and inner chains on the south. The rivers which rise between the inner and outer ranges of the Himalayas either flow, like the Arun (Ḳosi) and the Lopra-cachu* of D'Anville, through gorges in the outer chain to Bengal into the Tsampu, or into lakes between the two chains.

This grand plateau may in some respects be likened to the Collao of Peru lying between the maritime and eastern cordilleras of the Andes. Both sustain great flocks and herds; and in both a similar ruminant is used as the beasts of burden, the llama in Peru, and the sheep in Tibet. In Peru the Lake Titicaca, at 12,000 feet above the sea, is used as a means of communication by a line of steamers; in Tibet the Tsampu is a fluvial highway for merchants and their goods, also at a height of 12,000 feet above the sea; Tibet and the Collao of Peru alike abound in the precious metals, in salt and borax, but Tibet is more difficult of access. On one side the Collao has the maritime cordillera with passes leading to the Pacific coast, on the other the auriferous range of the Eastern Andes overlooking the rich alluvial plains of the Amazon. Great Tibet is more isolated. To the south the mighty range of the outer Himalaya can only be traversed by passes of extreme difficulty, and which are closed by snow during part of the year; while to the north a still more formidable journey over snow-clad plateaux and through fearful mountain gorges, which occupies several months, awaits the traveller who would pass from Tibet to China.

The people of Great Tibet, and their priestly rulers, have a strong claim upon the attention of European inquirers. It is to Chinese exclusive policy, and not to the Tibetans, that our ignorance of their country is due. In former days the intercourse between Bengal and Tibet was frequent and unchecked. The Tibetans are of Chinese race, and their language is allied to Burmese; but their Buddhist religion, their extensive literature, their written character, and their prevailing modes of thought, are all derived from India, and prove that for centuries there must have been an uninterrupted ebb and flow of commerce through the now closed passes of the outer Himalayan range. The monasteries in every part of Tibet, even the most inaccessible, with their armies of monks, the innumerable banners and monuments on every pass, all point to ideas which had their origin and long prevailed in the valley of the Ganges. The belief which forms the basis of Tibetan polity is of Indian origin too, and the Dalai Lama himself is an incarnation, in a certain sense, of a Hindu prince, the holy and sinless Sakyamuni. More strictly he is the incarnate Bodhisattva Padmapani, or Avalokitesvara, the heavenly representative of Sakyamuni. The Dalai Lama is the ruler of the province of U, with his capital at Lhasa; but an equally sacred incarnation rules over the Province of Tsang, namely, the Teshu Lama, whose capital is at Shigatze, and who resides in the adjacent palace of Teshu-lumpo. The Teshu Lama is an incarnation of the great Tibetan reformer Tsonhhapa, who flourished in the fourteenth century. The Tsampu River has been described as the boundary between the two provinces of the Dalai and the Teshu Lamas, U being to the north and Tsang to the south. But this is not exactly correct. Bogle mentions Chan-nam-ling and other towns north of the Tsampu as part of Tsang, while an examination of the lists of towns given by Klaproth and D'Anville shows that several towns reckoned as being within the province of U are south of the great river.

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* Shubanshi, in Assam.

The Lamas say that the intercourse between Bengál and Tibet fell off after the Muhammadan conquests in India, and it was still further interrupted by Chinese interference, and by the turbulent chiefships of Nepal and Bhutan on the outer slopes of the Himalayas. But there was nothing in the state of affairs to prevent a renewal of the old intercourse between Bengal and Tibet, and the establishment of friendly commercial relations, and this was perceived by the great statesman who established and consolidated our Indian Empire. Warren Hastings, the first Governor-General, and the only one whose name is a household word among the natives of India, lost no opportunity of extending the influence of the East India Company, and improving the condition of the people under his rule. Not the least important of his measures was the re-establishment of direct intercourse with Tibet, on occasion of the mediation of the Teshu Lama after the Bhutan War. He resolved to despatch an envoy across the Himalaya, one on whose abilities and discretion he could rely. The great statesman had trained a school of rising administrators, such as Kynynmond Elliot, whose early death in Orissa he so deeply mourned; Clevland of Bagulpur, the first to tame the wild Sonthals, and whose name is still remembered among them; George Bogle, and others of equal mark.

The choice of Warren Hastings fell upon the young secretary of the Board of Revenue, George Bogle, who set out for Tibet in company with Dr. Hamilton, an assistant-surgeon on the establishment, and an officer of the Teshu Lama named Paima; and after some detention in Bhutan, the travellers reached Pari-jong. This is at the pass at the head of the Chumbi Valley, which divides Bhutan from Tibet, separating the deep and wild gorges, well wooded and fertile, which slope down to the Bengal plains from the bleak plateau of the Tibetan side. In front were the grassy uplands patched with snow on which no Englishman had ever before set eyes, and on his right towered the sacred peak of Chumulari, 22,944 feet above the sea. Mr. Bogle, accompanied by Dr. Hamilton, and their Tibetan companion Paima, set out from Pari-jong, and entered Tibet on the 24th of October, 1774. This mission was politically important, and its results were of great geographical value. I think, therefore, that a brief reference to Mr. Bogle's discoveries, and to some of the incidents of his journey (time will not allow of more), can scarcely fail to be interesting to the Meeting.

Four days after leaving Pari, Mr. Bogle discovered two large Alpine lakes, called Shamtzo and Calutzo (the first is called Ramtchieu by Turner, the second is not named by him), connected with each other by a stream. He also traced the river flowing out of the Calutzo Lake, and found that to be a tributary of the Brahmaputra, and identical with the Penanang-chu. The name of the second lake and the direction of the outlet are entirely new geographical facts. The lakes were half frozen over, and well stocked with ducks and other wild fowl. Antelopes, *kyang*, and hares were also seen; and it was observed that animal life of all kinds was much more abundant on the bleak uplands of Tibet than in the wooded gorges of Bhutan.

But here a slight difference occurred between Mr. Bogle and his Tibetan friend Paima. The British Envoy was naturally anxious to have some sport, while the Tibetan looked with horror on acts of bloodshed, especially when actually within sight of the sacred peak of Chumulari. Paima strongly objected to shooting, insisting that it was a great crime, that it would give much scandal to the natives, and that it was particularly unlawful within the liberties of Chumulari. Mr. Bogle had many long discussions with him on the subject, and tells us that "they were supported on the side of the Buddhist by plain common-sense reasons, drawn from his religion and customs; on the side of the British Envoy by those fine-spun European arguments which serve rather to perplex than to conıce." The latter gained nothing in argument; but at length a npromise was arranged. Mr. Bogle agreed not to shoot until they ıre fairly out of sight of the holy mountain, and Paima consented suspend his prohibition in solitary and sequestered places.

The march down the valley of the Penanang-chu and across the ıer chain of the Himalayas to the Tibetan towns of Giantze and inom has been described by Turner, who followed along the ne road a few years afterwards. But Turner never went beyond shu-lumpo, while Mr. Bogle crossed the great river Tsampu, near igatze, at a point where it is about the width of the Thames at tney. Having drunk some of its water, washed his hands and t, and thrown a rupee into it, he embarked in the ferry-boat, of ıich there were several at this place—well-built, flat-bottomed rges, about 25 feet long, consisting of a flooring of thick planks d perpendicular sides, about 4 feet high, with an opening at either d, cut down to 2 feet, the whole bound together with bars of n, and painted white. There was a large oar on each side, pulled two men and pushed by another facing them, while a woman lped, by hauling on a line made fast to the end of the blade. The ering is managed by a large oar from the stern. The boat carried er twenty-three persons, seven horses, and fourteen asses, besides ggage. The river is not rapid at this place, and great herds of llocks and flocks of sheep were waiting on each side for a passage. the summer a lighter kind of boat is used for transporting goods, de of hides, with ribs of willow-poles, about 8 feet long by road. Mr. Bogle saw many of them on the bank, keel up, and ne, with an end raised, serving as habitations for the boatmen.

The flocks of sheep are used as beasts of burden. Some were ning from the wild and desolate country to the north, laden with t: others were returning from Giantze with cargoes of barley. . Bogle describes them as large animals, with horns extending rizontally. He met flocks of 1200 sheep, each carrying two bags grain weighing 20 to 25 lbs. They were very obedient to the pherd's call, and if any of them happened to stray they were ily brought back by the shepherd's dog.

After crossing the Tsampo, Mr. Bogle marched up the valley of Shiang-chu to Namling, and went thence to a small palace, called sheripgay, in a gorge a few miles beyond Namling, where the shu Lama had resided for two years, owing to the prevalence of all-pox at Shigatze.

The Envoy describes the palace, the retinue, and the ceremonies receptions with graphic minuteness; and he formed a deep and ting friendship for the sacred person of the Teshu Lama himself which had a temporarily important influence on British interests, and, if the two men had lived, might have led to permanently good results. The Lama was then about forty years of age. Although endowed with a portion of omniscience and many other divine attributes, his Holiness accommodated himself to the weakness of mortals, and endeavoured to make himself loved rather than feared. The expression of his countenance was smiling and good-humoured, his disposition open, candid, and generous. He was extremely merry and entertaining in conversation, and told a pleasant story with much humour and appropriate action. Mr. Bogle describes the ceremonies of blessing the people, the religious services, and the grand procession from Deshripgay across the Tsampu to Teshu-lumpo, when the Lama returned to his capital. He was on most intimate terms of friendship, not only with his Holiness, but with his young nephews, the Pyn Kushus, and his nieces, the nuns, with whom he had a great deal of laughing and merriment. During a week in March Mr. Bogle and Dr. Hamilton went to a country seat of the Pyn Kushus, on the northern bank of the Tsampu, whence they obtained a magnificent view of the windings of the river and adjacent mountains, and where their hosts exerted themselves to amuse them by hunting-excursions, and to please them by the most cordial hospitality; for the Pyn Kushus made no scruple about shooting when by themselves, and showed Mr. Bogle some good sport with greyhounds, got up matches with bows and matchlocks, and a grand hunt after musk-deer. But they had some fear lest they should get into a scrape with the Teshu Lama if these transgressions were mentioned to him. On the whole, nothing could exceed the cordial friendship which sprang up between Mr. Bogle and the Teshu Lama's family.

When the Envoy finally left Teshu-lumpo on his return to Bengal, on the 8th of April, 1775, he tells us that he took "his last farewell of the Lama with an aching heart, having become strongly attached to him for his civilities, his betwitching manners, and his amiable character." Nor was this friendship of a fleeting kind. A correspondence was kept up between the two, after Mr. Bogle had returned and was appointed Collector of Rangpur. The letters from the Teshu Lama (one of which is on the table) were written in the curious Tibetan character, on paper made from a species of *Daphne*, which grows in Nepal and Bhutan. At Rangpur, Mr. Bogle established a fair, with special immunities and advantages for the Tibetan and Bhutanese merchants, and encouraged the intercourse between Tibet and Bengal by every means that his official position gave him, and with the warm support of the Governor-General.

Unfortunately the good Teshu Lama was induced by the Emperor of China to visit Peking, where he died of small-pox; and in the same year, 1872, Mr. Bogle died at Rangpur. There can be no doubt that the way had been paved for opening the passes into Tibet for traffic and free intercourse. But the premature loss of the negotiators was a death-blow to the bright hopes that were justified by their friendship. Besides his journal and letters, Mr. Bogle drew up valuable reports on the trade of Tibet, on its religion and politics, and on the people. On his death all his papers were packed up and sent to his friends in Scotland, and they have remained untouched and unutilized, in a house in Ayrshire, until the present year. It is true that Warren Hastings did not lose sight of his plans respecting Tibet; he sent a second embassy under Captain Turner in 1783, which reached Teshu-lumpo, following Mr. Bogle's route exactly, but not going beyond that point. The good Lama was then dead, his successor was an infant, and the only result of the mission was the publication of Captain Turner's interesting narrative in 1800.

The death of the Teshu Lama and of Mr. Bogle, and the retirement of the great and enlightened statesman who placed them in communication with each other, were the unfortunate events which put an end to the friendly, commercial, and diplomatic intercourse between the two countries. And there were evil influences of another kind at work. In Mr. Bogle's conversations with the Teshu Lama there is frequent allusion to the turbulent and aggressive policy of the Gorkha Raja of Nepal, and to the hindrances he was placing in the way of commercial transactions between India and Tibet. At last the Nepalese army invaded the province of Tsang, and plundered the monastery of Teshu Lumpo. This led to intervention on the part of China, and in 1792 a great Chinese army marched into Tibet, utterly defeated the Nepalese at Tengri-maidan, drove them across the Himalaya, and dictated a humiliating peace within 20 miles of Kathmandu. From that time the political influence of China in Great Tibet has been paramount; and although the internal administration is not interfered with, Chinese troops remain in occupation, and the exclusion of foreigners is enforced by officially watching the Bhutan, Sikkim, Nepal, and Ladak passes.

It has been said that the watch is so strict as to render it impossible for any Englishman to have passed into Tibet since 1792. But this is not the case, as is proved by the fact, that in 1811, Thomas Manning actually reached the city of Lhasa, although it is true that he is the only Englishman who ever succeeded.

The journey of this adventurous traveller has never been described, and his manuscript narrative has remained unused in the hands of his family ever since. This is the second English traveller to whose labours I desire to call the attention of the Meeting.

Thomas Manning was a mathematical tutor at Cambridge, who, after leaving the University, brooded over the mysterious empire of China, until at last he resolved to undertake a voyage to Canton to study the language, and then to attempt the exploration of the unknown interior. Manning was the friend and correspondent of Charles Lamb, who, during 1803, frequently urged his friend to give up the intended visit to Independent Tartary, as he called it. "The reading of Chaucer has misled you," writes Lamb. "Do not credit his foolish stories about Cambuscan and the ring, and the horse of brass. Believe me, there are no such things. 'Tis all the poet's invention. A horse of brass never flew, and a king's daughter never talked with birds. These are all tales. Pray try and cure yourself. Take hellebore. Pray to avoid the fiend. Read no books of voyages, they are nothing but lies, and O, do not go to Independent Tartary!" But all remonstrances were in vain, and armed with a letter of introduction from Sir Joseph Banks, he sailed for Canton in 1806. After remaining there for some years, studying the language, he proceeded to Calcutta, whence in September 1811, he set out on his adventurous expedition to Tibet. It would appear that he applied to be employed officially as an Envoy, for when the Chinese authorities at Pari hinted at overtures for opening commerce between Tibet and India, he exclaims, "I cannot help feeling what fools the Company are to give me no commission, no authority, no instructions. Fools to neglect an opportunity they may never have again." Manning was obliged to go as a doctor, and in disguise, and of course his difficulties were thus multiplied tenfold. Fortunately he encountered a Chinese General on the frontier at Pari-jong, who was civil to him, and with whom he travelled to Lhasa. From Pari to Giangtze he followed the route taken by Bogle and Turner, but there, instead of turning west to Teshu-lumpo, he crossed the inner range of the Himalaya, and reached the famous ring-shaped lake of Palti or Yamdok-chu.

Manning's journal is a personal narrative, containing many incidents of the road, and is especially valuable for its account of Lhasa and of the Dalai Lama; but it contains little geographical information; and if it had not been for the accounts of Bogle, Turner, and the Pundit of 1865, it would not be easy to make out his route. He skirted along the Yamdok Lake for several days, and gives the Chinese name for it as *Haitu* (little sea). But he does not appear to have known the map of D'Anville, or the peculiar form of the lake with its large island as there delineated. He merely says, "from the opposite margin of the lake rose diminutive mountains in a continued chain." He further says that the water of the lake is said to be very unwholesome, and that it is not used for drinking. Manning crossed the Tsampo in a large and good ferry-boat, and reached Lhasa without further adventures. The Dalai Lama was then about seven years old, and the traveller was much impressed by the refined beauty of his Holiness. He had the simple and unaffected manners of a well-educated princely child. His face was poetically, even affectingly, beautiful, and he was of a gay and cheerful disposition; his mouth perpetually unbending into a graceful smile, which illuminated his whole countenance. Mr. Manning's narrative of his stay at Lhasa is full of interest. He intended to have pressed on to China by way either of Sining or Bhatang, but eventually he was obliged to return to India by the road he came, finally leaving Lhasa on the 19th of April, 1812.

Thomas Manning was the last Englishman who ever entered Great Tibet; and only two Europeans have since been at Lhasa, namely, the Abbé Huc and Gabet in 1846. Manning's journey shows that, even after the Chinese campaign of 1792, Europeans could pass from Bengal, through Bhutan, to Lhasa; and that the difficulty of recovering the ground gained by Warren Hastings and Bogle is not insuperable. But since 1812 the work has been confined to enquiries and to visiting the heads of passes—so far as Englishmen are concerned. Csoma de Körös did much valuable service in this way. Mr. Hodgson, during his long residence at Kathmandu, collected a mass of information respecting the geography, ethnology, trades, languages, and literature of Tibet. Captain Pemberton, during his mission to Bhutan in 1838, and Mr. Eden, in 1864, made further additions to our knowledge, which has been still more recently extended by the investigations of Mr. Edgar. But the list of those who have actually reached the head of the passes leading to that forbidden land, which was formerly explored by Bogle, Turner, and Manning, is very brief. First among them are Dr. Hooker, the President of the Royal Society, and the late Dr. Campbell, who reached the Donkia and Kongra-lama passes (18,500 feet above the sea), leading from the head of the Tista Valley in Sikkim, to Tibet, in 1849. Dr. Hooker also visited two passes leading from Nepal. In 1870 Captain Chamer went as far as the Donkia Pass; and in 1871 our associate, Mr. W. J. Blanford, accompanied by Captain Elwes, explored the passes leading from Sikkim to the Chumbi Valley, and visited those of Donkia and Kongra-lama, leading to Tibet. But no one, since the return of Manning in 1812, has ever reached Pari-jong, at the head of the Chumbi Valley, the pass most used and most practicable, and by which all the three English explorers entered Tibet.

This total cessation of intercourse, either diplomatic or through English travellers, gives the arrangements of Colonel Montgomerie for exploring Tibet, by the agency of natives, an importance which can scarcely be over-estimated. Three journeys of Colonel Montgomerie's Tibetan emissaries have been completed, and the results worked out; and one, that of the Pundit of 1865, has already been discussed at one of our Meetings. This explorer traversed the Nepal pass of Kirong, first sighted the Tsampu at Tadum Gumpa, and travelled down its valley to Lhasa. At Talla Lobrong the Pundit found the height of the Tsampu Valley to be 14,187 feet above the sea; at Shigatze, 11,822, so that there is a rapid descent. From Janglache, an important place on the Tsampu (or Narichu) mentioned by Bogle, to Shigatze, a distance of 85 miles, merchants and their goods are conveyed down the river in boats. The Pundit also describes the Yamdokchu (Palti) Lake, visited by Manning, as being 45 miles round, but only 2 or 3 wide, because it encircles a large island with hills rising 2000 or 3000 feet above its surface, as delineated on D'Anville's map. But the Pundit, in contradiction to Manning, says that the water is sweet. The Pundit was at Lhasa from January to April, 1866, and fixed its height at 11,500 feet above the sea. On his return he traversed the whole length of the valley of the Tsampu from Chusuljong (11,300 feet) to Tadum (14,187 feet), and thence 140 miles higher up to the Marian-la Pass, which separates Tsang from Ari, or Great Tibet from Little Tibet.

Colonel Montgomerie's second Tibetan explorer set out in 1871. He crossed a pass in eastern Nepal, called Tipta-la (Wallangchoon), which had been visited by Dr. Hooker in 1848, reached the Arun river, a tributary of the Kosi, and after traversing two other passes, discovered a large lake, 20 miles long by 16, called Chuntodong, 14,700 feet above the sea; which he mentions as part of the boundary between Sikkim and Tibet. He then crossed the Lagulung Pass (16,200 feet) over the inner Himalayan range, and reached Shigatze. All this was new work; but the most interesting part of the journey was that from Shigatze back into Nepal, when he crossed the great plain of Tengri-maidan (13,860 feet), where the Nepalese were defeated by the Chinese army in 1792.

Thence he followed a trade-route down the Butia Kosi, through a fearful gorge. The road crosses the river no less than 15 times, 3 by iron suspension bridges and 11 by wooden bridges, 24 to 60 paces long. At one place the sides of the gigantic chasm were so close that a bridge of 24 paces would span it. Along the perpendicular wall of rock a path is supported on iron pegs let into the face of the rock. The path is of stone slabs covered with earth, only 18 inches wide, a third of a mile long, and 1500 feet above the roaring torrent. Such are the stupendous difficulties which have been overcome in establishing communications between Nepal and Tibet.

The third explorer, a young Tibetan, who had been thoroughly trained for the work, was dispatched by Colonel Montgomerie, in 1871, to explore the unknown regions north of the Tibetan watershed of the upper Brahmaputra or Tsampu. He reached Shigatze in November, and having purchased 50 sheep to carry the baggage, he crossed the Tsampu at the point where Mr. Bogle had been ferried over in 1774, and followed Mr. Bogle's route to Namling, on the right bank of the Shiang-chu river. It is interesting to find that, on more than one point, the long-forgotten journal of Mr. Bogle furnishes evidence of the accuracy of Colonel Montgomerie's explorer. Thus the Chom-gompa, where, according to the explorer, there are 100 nuns, is in the very spot where Bogle stopped with the Teshu Lama, and was visited by nuns.

The explorer advanced north from Nam-ling with the intention of crossing the range, called by Hodgson the *Nyenchhen-thanglá*, and of exploring the great Namcho Lake—the Tengri-nor of D'Anville and the Chinese surveyors. The range was crossed by the Khalamba-la Pass, 17,200 feet above the sea, on the 8th of January, 1872. In this mountain-range there are numerous hot springs, and two Geysers, which throw up jets of water to heights exceeding 60 feet. The water, in falling again, freezes and forms pillars of ice up to the full height of the jet. These pillars are 30 feet in circumference, and the water within them, which is thrown up with great noise and violence, stood at a temperature of 183°, the boiling-point at that elevation being only 183·75°.

The great lake to the north of the mountain-range is called Namcho, or the "shy lake" (Tengri-nor of our maps), and was found to be 50 miles in length by from 16 to 35 miles broad. To the south it is bounded by the *Nyenchhén-thanglá* Range, consisting of snowy peaks flanked by large glaciers, and culminating in the magnificent peak of *Jáng Nyenchhen-thangla*, which is probably more than 25,000 feet above the level of the sea. The range was traced for more than 150 miles, running in a north-easterly direction. To the north of the lake the mountains are not so high. Between the Nyenchhen-thangla and the Kuen-lun Ranges the lofty plateaux are inhabited by nomadic tribes and bands of robbers; there is no cultivation, and the monasteries are the only fixed habitations. The drainage is into the salt lakes at the lowest levels of this region, the chief of which is the Namcho or Tengri-nor.

The Namcho Lake is considered sacred; and although at such a very great distance from inhabited districts, and at so great an elevation above the sea, there are several permanent Buddhist monasteries on its banks and on islands which are visited by large numbers of pilgrims. The lake is 15,500 feet above the level of the sea.

The explorer, making the monastery of Dorkiá, on the western shore, his head-quarters, made the complete circuit of the lake, and found that it had no outlet. The largest influent is the Nai-chu, a very large stream coming from the east, about 40 paces across near the mouth.

After returning to Dorkiá, the explorer once more set out on the 11th of February, 1872, and a few days afterwards he made a short excursion to the northward, and discovered another smaller lake, called Bul-cho.* But on the 18th, as the travellers were about to start, a band of sixty armed robbers arrived on horseback, and, in spite of their entreaties, took away all their clothes and provisions, leaving them nothing but the instruments. After much begging, the robbers gave them back a piece of cloth each, with two sheep and two bags of food, but added, that if they gave any more trouble they would be killed. The explorer had intended to have made his way from the Namcho Lake to China; but after the robbery he was obliged to march as quickly as possible in the direction of Lhasa, where they were likely to get into inhabited ground soonest. After suffering many privations, the explorer recrossed the mountains by the Dhok-la Pass, and reached Lhasa on the 9th of March, whence, after a long and difficult journey, he returned to the head-quarters of the Great Trigonometrical Survey. His route-survey extends over 320 miles of a hitherto entirely unknown country; the chief discoveries being the position, size, and elevation of the great Namcho Lake, and the height and direction of the Nyenchhen-thangla Range.

Thus, through the labours of these three brave and intelligent native explorers, Colonel Montgomerie has furnished us with exact geographical knowledge respecting three of the passes between Nepal and Tibet—of Kirong, the Nilam-la, and Tipta-la; respecting the whole valley of the Tsampu from the Marian-la Pass to Chasul-jong; the famous lake of Palti or Yamdok-chu; the position of Lhasa; the great chain forming the northern boundary of the basin of the Upper Brahmaputra; the Namchu Lake, and the interior drainage of Northern Tibet.

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* Bul means borax. It is the chief source of supply for Lhasa.

This information, combined with the investigations of Hodgson and others, and the personal observations of Bogle, Turner, and Manning, enable us to form a sufficiently accurate idea of the trade-routes leading from India to Great Tibet, up the gorges of Bhutan, Sikkim, and Nepal; and of the physical features of the great plateau in rear of the Himalayan ranges.

Commencing from the east, the first trade-route is through the country of the Towang Bhuteas, who are directly subject to Lhasa, down to Udalgori in Assam. Next we are told by Captain Pemberton, who traversed nearly the whole of Bhutan from east to west in 1838, that there are several passes leading from Tibet into the valley of the Manass, the traders finding their way to Dewangiri at the foot of the hills, and afterwards repairing to a great annual fair at Hazu, opposite Gowhatty in Assam. Then comes the pass of Pari-jong, by which Bogle, Turner, and Manning found their way from Bhutan into Tibet, and whence Tibetan traders proceeded by Paro and the Baxa Dicar to the fair established by Mr. Bogle at Rangpur. At Rangpur duties were abolished, and buildings were erected for the convenience of the merchants, as well as of their animals and goods, the annual cost to Government being only 70*l*. The Bhutan caravans arrived in February and March at Rangpur, returning in May and June; merchants were thus attracted to Rangpur in great numbers, and the excellent arrangements for the benefit of trade, which were made by Mr. Bogle, continued for half a century after his untimely death. But Bogle's arrangements were neglected; and since 1834, when the Government aid was discontinued, the Rangpur trade has almost entirely ceased. At the Assam fairs, gold-dust, salt, musk, cow-tails, woollens, and horses are exchanged for lac, madder, silk, cloth, and dried fish.

The eastern Sikkim Passes leading into the Chumbi Valley, called Jelep-la, Guatin-la, Yak-la, and Cho-la, have recently been examined by Mr. Blanford and Mr. Edgar. They are rarely interrupted by snow for many days, and form an alternative route to that through Bhutan, up the Chumbi Valley to Para-jong. Further north is the Tankrala Pass, 16,083 feet above the sea, which is the *most snowy pass in Sikkim*, and the most difficult of access. The

Donkia-la, at the head of the eastern branch of the Tista, is 18,466 feet above the sea, and the Kongralama Pass at the head of the western branch is lower (15,745 feet). They are used by Tibetan herdsmen, who bring their cattle to graze in Sikkim, and by the people in the upper valley of the Tista branches, the Lachin and Lachung, who twice a year carry wood into Tibet, and bring back loads of salt in return.

The passes from Nepal into Great Tibet follow the tributaries of the Kosi River. The two easternmost were visited by Dr. Hooker, and one, the Tipta-la, was crossed by Colonel Montgomerie's second explorer. The more westerly pass, by the Butia Kosi, was used by the same explorer on his return to India through Nepal. Its appalling difficulties have already been alluded to, and this is not the route adopted by the Chinese army in 1792, when it advanced upon Kathmandu. The easier military pass to the westward is closed to commerce by the Chinese officials. It leads by Jongh-a-jong to Kirong.

Once the intercourse between Bengal and Tibet by means of these passes was frequent, and it should certainly be the aim of our rulers to restore it. The Tibetans have always shown themselves desirous to promote such intercourse, and there is certainly no reason why the policy of permitting the passes to be closed through the jealous and selfish exclusiveness of the Chinese Government should be continued. Bogle enumerated the products of Great Tibet as consisting of gold, musk, cow-tails, wool, and salt. He said that the genius of the Tibetan Government was favourable to commerce, and that no duties were levied on goods, so that, in his time, many foreign merchants had settled in Tibet. Cashmirian traders had establishments at Lhasa and all the principal towns of the country, and the Gosains, or trading pilgrims of India, resorted to Tibet in large numbers. Their trade was confined to articles of great value and small bulk, and they travelled without ostentation, and often by paths unfrequented by other merchants. The Kalmuks annually came to pay their devotions to the Lamas, bringing camels laden with the furs and hides of Siberia. The Bhuteas brought the products of Bengal and Assam, while the Chinese had established themselves in great numbers at Lhasa, and carried on a lucrative trade in the teas, porcelains, and brocades of their native country. The merchants of Bengal and Bahar sent their goods by the passes of Nepal and Bhutan. They consisted of broadcloth, indigo, pearls, coral, chank, spices, tobacco, sugar, white cloths, satins, and the returns were in gold, cow-tails, and musk. It was this trade which Warren Hastings did so much to foster, and which Bogle, as collector of Rangpur, encouraged by the establishment of a fair, and the grant of privileges and immunities.

But all the ground gained by these able administrators in the last century has since been lost. Mr. Edgar, the Deputy Commissioner of Darjiling, tells us a very different story in 1874. Owing to the insecurity of the roads, the trade between China and Tibet is now much less considerable than was formerly the case. The chief article is tea of a coarse description and unpleasant flavour, which sells at Lhasa for eight annas the pound; and so totally have the English neglected the Tibetan markets, that actually Chinese tea is imported through Tibet into the British district of Sikkim for the use of the inhabitants, although tea is grown on the spot. European and Indian goods mainly reach Tibet through Nepal and Ladak, and consist of broadcloth, cottons, corals, pearls, tobacco, opium, and some rich stuffs. The exports from Tibet by these channels are blankets, musk, cow-tails, borax, ponies, gold and silver, but no wool. There is also some local trade with Sikkim and Bhutan. The great wealth of Tibet lies in its flocks and herds, and enormous quantities of wool and ghee might be imported into Bengal at cheap rates, if good practicable passes were once opened. The route proposed by Mr. Edgar is by a bridge across the Tista in Sikkim, and a road thence to the Cho-la Range.

In the present paper I have endeavoured to bring to your notice the valuable results of the journeys of Mr. Bogle and Mr. Manning, which have only now been brought to light, and to give a brief account of the recent labours and discoveries of Colonel Montgomerie's explorers in Great Tibet. These accounts embrace part of a very important subject, namely, that of the re-establishment of friendly commercial intercourse between Tibet and Bengal, a subject which will most assuredly receive attention in the near future. One thing is certain, that any steps that may be taken to open diplomatic intercourse with the Teshu and the Dalai Lamas, or to promote trade through the Himalayan Passes, cannot fail to add to our stock of geographical knowledge.

Colonel T. G. MONTGOMERIE said that for some time the officers of the Trigonometrical Survey in India were employed in the North surveying the frontier, and naturally the great regions beyond attracted their attention; but the Government of India were anxious that nothing should be done to endanger those connected with the Survey. The officers, however, endeavoured to acquire as much knowledge as possible of the countries beyond the mountains, and it became known to him personally that the longitude of Yarkand was not what it had been represented by Humboldt, and in the great surveys connected with China. Consequently, when the survey on the frontiers approached completion, arrangements were made for carrying on explorations beyond. One man was sent to Yarkand. He made a route survey, and succeeded in fixing the position of that place. His figures had since been tested by European explorers and skilled observers, and were found to be correct. The next step was carried out by Mr. Johnson, who was employed on a survey close up to the frontier at various heights, from 15,000 feet to 22,000 feet above the sea. He crossed the Kuen Lun range, and was the first European who had succeeded in passing from the plains of the Punjaub to the basin of Eastern Turkistan. He found the Himalayas to be 400 miles in width at apparently their narrowest part. It was then found impossible to employ Europeans to make the explorations that were desired, and a number of natives were therefore trained to do the work. When he (Colonel Montgomerie) required some one to make a journey into Tibet, he selected a man who was either a semi-Tibetan, or had friends who were in the habit of travelling in that difficult country. Such a man was regularly trained to observe the stars and to make route surveys, and he was then sent out upon a trial trip over ground of which the maps had not been published, but existed in manuscript, so that his work could be tested. After several such trials, if his results were correct, he was sent into unknown territory, starting from one known point and closing upon another known point. If he performed that journey satisfactorily he was given charge of a longer expedition. The chief Pundit, who had been referred to in the paper, carried a route survey down the whole length of the Sangpo (Tsampu) or Brahmaputra River. Up to the year 1863 the upper waters of many of the large rivers of India were still unknown. A considerable portion of the Indus was unknown. It was supposed that the main branch ran past Garo or Gartok, but it was not known whether there was a second branch or not. Neither was it known how the Brahmaputra, or the Upper Kurnali or the Kosi River ran. A great deal had since been done, but much still remains undone. The upper course of the Indus was now known, but a portion, about 180 miles, between the Astor Valley and Torbela near Attok, had not yet been traced. Still greater ignorance prevailed about the last 350 miles of the Brahmaputra, for it was not certainly known whether the Sangpo was really the Brahmaputra or not. Although the head waters rose not far from British territory, and the lower part of the river flowed through British territory, there was still an unknown portion of about 350 miles. Explorations had now been carried on throughout every part of the frontier of India, from Kelat to Cabul, then across the Hindu Kush, down to Fyzabad, up the Oxus, across the Pamir Steppe to Kashgar, from Kashgar to Yarkand, round to Rudok, and down to Lhasa. Only a few days ago he heard of the return of the chief Pundit, who had been lately in Eastern Turkistan. He had crossed over from Ladak by a northerly route, passed through a succession of gold-fields, came down upon the Brahmaputra near Lhasa, travelled down the river for some distance, and came out at Udalgiri in Aasam, passing through Towang. Now that the Geographical Society threatened to make an end of Africa, and the Arctic regions were likely to be thoroughly explored before long, there was nothing left for them but the happy hunting-ground to the north of India. If any enterprising gentleman wished for a trip in a Rob Roy canoe, he might put himself on the Brahmaputra at the Mariamla, near the Mansarowar Lake, and pass down through the length of Middle Tibet. He would thus have an opportunity of exploring the unknown 350 miles. Another trip might be taken from Little Tibet, down the Indus, to Tobela and Attok. The large district extending from Lhasa to Kashgar, and from Kashgar across the desert of Gobi, right away to China, was still an unknown land, and offered a large field for future geographical enterprise.

The PRESIDENT reminded the meeting that geographers were very much indebted to Colonel Montgomerie for having originated the institution of native explorers, which was one of the most valuable agencies for the acquisition of geographical knowledge that had ever been established in India. With reference to the suggestion that some one should descend from Lhasa to Sudiya in a Rob Roy canoe, it must be remembered that in a short space of 300 miles the river falls 10,000 feet. No doubt there were some tremendous rapids and cataracts in that interval, so that it was by no means certain that a canoe would reach Sudiya in safety. He, however, echoed Colonel Montgomerie's hope that the routes would be explored. But there were other questions than those of mere geography connected with this subject of Tibet, such as that of the trade railways between India and the countries conterminous with it on the north-east; and the Society was fortunate in having present two ex-Governors of Bengal, Sir George Campbell and Sir Cecil Beadon, who had carefully studied the question of trade routes.

SIR GEORGE CAMPBELL said although Mr. Markham had not travelled in Tibet, his enquiries at home had been as effectual as the work of many travellers. It was a remarkable instance of what might be done by energy and zeal, for he had succeeded in unearthing narratives of travel which had remained unknown for nearly a hundred years. Something was previously known of Captain Turner's journey to Tibet; but of Mr. Bogle's journey, all that we knew was that it had been made. It was supposed that the record of it had been entirely lost, but it now appeared that it had been kept, and would be given to the world. At the same time Mr. Markham had obtained the history of a journey by another traveller, Manning, in 1812, of whose very existence most Asiatic geographers were absolutely ignorant. He thought hardly sufficient attention had been paid to the very minute and particular account of routes between Lhasa and China, which was furnished by the French missionaries, Huc and Gabet. It was sometimes the fashion to discredit their statements, because they were, no doubt, a little credulous about the stories that were told to them; but he had read not merely the short English abstract of their travels, but a much fuller French edition, and compared it with the information which had since been obtained, and the impression left upon his mind was that, as regards the facts that came within their own observation, their accounts were most reliable in every way. They were not scientific men, but they gave correct descriptions of the routes they travelled from the north of China to Lhasa, and from Lhasa to southern China. Considering the precise information which those missionaries afforded, and the results which had been obtained from the journeys of Colonel Montgomerie's natives, it might be said that a very good knowledge was now possessed of the geography of the routes between India and China by way of Tibet. He had taken great interest in the subject of trade between India and Tibet, and believed that the Tibetans themselves had really very little objection to trading with the English, the difficulties that were placed in the way arising solely from political considerations on the part of the Chinese. Englishmen knew something of protection and monopoly, and it, therefore, was not very unnatural that Chinese protectionists should insist on protecting their trade in tea. It had been said the want of enterprise on the part of British tea-growers was so great, that the Chinese tea was brought down for sale over the hills to the British dominions, but that was a mistake. In Bhotan, Sikkim, and Kashmere, brick-tea was still sold in small quantities, but that arose simply from the habits and customs of the people. For certain ceremonies brick-tea was regarded as necessary, and must be had, whatever price was paid for it. Assam tea had, for most purposes, superseded Chinese tea in all the countries to which it had access, but the Tibetans had placed an *embargo upon it*, and until that embargo was removed, Assam tea could not find its way across the hills. It appeared to him that however much might be learnt of the Towang route, there could be little doubt that the route by way of Darjeeling was clearly the best to Tibet. A road might be made, as he hoped it would, into Sikkim, and so into the frontiers of the Choombee Valley, which was the outlying post of the Tibetans, running between Bhotan and Sikkim; but Europeans, and even Hindoo and Mahometan merchants, were not allowed to enter by that route, being compelled to go round by way of Nepaul. He could not greatly wonder at the exclusiveness of the Chinese, for they had got into trouble on many occasions when they had admitted Europeans into their country; but that repugnance must be overcome by great consideration being shown towards them, and by not attempting to back up, in all quarrels and all demands, every European adventurer, whoever he might be, who tried to penetrate into the country. Full and equal justice should be done to the inhabitants, so that when a man went among them and behaved in a manner that was creditable to the British nation, they might receive him without fearing that another who might be violent and unjust would be supported in his violence and injustice. The Tibetans and Bhotaeas were active and good traders, and the only difficulty in the way of facilitating intercourse was the political one. As long as the British in India were a distant power the Tibetans were not afraid, and permitted free intercourse to take place; but since so many states had been absorbed, and the British power had come close to them, they were naturally a little afraid, and pursued the policy of keeping the English at arm's length. They would not even carry on any correspondence with the English, and returned unopened any letters that were sent to them. When the softening influence of a just and considerate policy had reached the Tibetans, and diplomacy had produced an effect upon the Chinese, no doubt a very considerable trade would be established, and residents in India would be able to take pleasant and healthy trips beyond the Himalayas. Now that so many difficulties had been interposed in the way of communication with China in another direction, it was very important that every effort should be made to open the route between the eastern extremity of the Assam Valley and Batang upon the frontiers of China and Tibet. During his administration of Bengal he had occasion to draw a good deal closer than formerly the intercourse with the tribes occupying the hills, who had become much more amenable than they used to be. So far as those tribes were concerned, he believed there would be no real difficulty in establishing a communication with Batang. There again the only difficulty was the political one. If that could be overcome, the communication might follow the course of the Brahmaputra proper, and so reach the great province of Szechuen, and perhaps open a way for Chinese emigration into the tea-districts of Assam, which were perhaps the best in the world.

Sir Cecil Beadon entirely concurred with Sir George Campbell in the praise he had given to Mr. Markham, for the extremely interesting paper which he had read. When he (Sir Cecil Beadon) was in Bengal, one or two attempts were made to explore the Brahmaputra, so far as it was practicable, by means of steamers and boats, and on one or two occasions considerable progress was made in going up that branch of the river called the Diing; but at no great distance above Sudiya it was found to be so exceedingly rapid, and the course so much contracted, that the steamers were unable to stem the current, and the attempt was given up. Between that point and the Towang route the countries bordering upon the valley of Assam were entirely in the possession of semi-savage tribes, with whom our relations are not of a very satisfactory nature, and through whose territories he was not aware that any pass had ever been explored by any European. Through the Towang Pass there was a considerable trade direct from Tibet, and that trade, he believed, had never been interrupted. It was not, however, open to Europeans, being entirely confined to the Tibetans and the Indian traders who went up the valley of Assam. By the treaty which was concluded with the Bhotaese after the campaign of 1864, a small portion of the Hill territory was transferred from Bhotan to British India, and a military station was formed there. From that point there was a road leading directly up, and some little trade found its way by that route. The natural route, however, was that to which Sir George Campbell had referred, up the valley of the Tista, below the Great Darjiling spur, to the pass which led into the valley of the Chumbi. That was the route which commerce had followed for ages, but Europeans were not allowed to penetrate into Tibet by that route. When he was in Bengal an attempt was made to carry a road up the valley of the Tista as far as the pass which separated Tibet from the newly-acquired territory of Bhotan, but very little progress was made. Whatever was done it was not probable that the trade between Bengal and Lhasa would ever assume very large dimensions, for the heights of the passes, probably not less than 18,000 feet, and the extremely steep ascent on the south side, would require a very large expenditure indeed to make the route practicable for anything but pack-animals. When he was at Darjeeling an effort was made to establish a fair in the neighbourhood of the station, and some little traffic between the traders from the plains and from Tibet took place; but although apparently there was no objection on the part of the Tibetans to resort to the fair, the trade did not prosper.

Sir RUTHERFORD ALCOCK agreed entirely with Sir George Campbell as to the best route by which to communicate with China by Batang. No geographical difficulty was interposed by that route, and it was only political jealousy that prevented a considerable trade springing up in that direction between the plains of India and Szechuen. Wherever Europeans penetrated in the East trouble almost invariably followed, more especially in connection with China, which had already had three wars with England. It was not therefore to be wondered at that great difficulties should be placed in the way of our further advance. Patience and forbearance must be exercised, and no doubt in the end a communication would be established that would be beneficial to both places.

Mr. W. H. JOHNSON, the traveller who crossed the Kuen Lun into Khotan in 1866, was then introduced to the Meeting by the President. He thanked the President and Colonel Montgomerie for the honourable mention they had made of his services in connection with the Great Trigonometrical Survey of India, and hoped that many explorers would ere long be found to visit the great country which Mr. Markham had so ably described.

The PRESIDENT said that for many years past Mr. Johnson had been Commissioner for the Maharajah of Kashmere in Ladak; and in fact, was the Governor of that district. In that capacity he had rendered most important services to the British Government in facilitating the transit of Mr. Forsyth's mission, and later still Mr. Shaw's mission. His services had been very highly spoken of both by the officers concerned and by the Government. He was at present in England on leave, and was about to return to Ladak, where it was to be hoped he would continue his geographical labours, and occasionally send home such information as he was able to collect with regard to that very interesting country to the east of Ladak, where the gold-fields existed, but regarding which very little was at present known.

AWARD OF MEDALS.

In conclusion, the PRESIDENT announced that the Royal Gold Medals of the year had been awarded to Lieuts. Weyprecht and Julius Payer, for their explorations and discoveries in the Arctic Sea, between Spitzbergen and Nova

Zembla. It was an unusual thing to give two medals for one expedition, but Weyprecht and Payer were *par nobile fratrum*, and it was impossible to dissociate one from the other, both being commanders, the one of the nautical, and the other of the land operations. He hoped that they would be able to be present at the Annual Meeting in person, but if they should be unable to attend no doubt the Austrian Ambassador would take charge of the medals in their name. The Public School Examinations had also been concluded, and Eton had again been victorious in both departments. The following were the successful competitors:—

PHYSICAL GEOGRAPHY (Examiner, Major-General R. STRACHEY, R.E., C.S.I., F.R.S.).

Gold Medal.—Henry Alexander Miers, Eton College.
Bronze Medal.—Archibald Edward Garrod, Marlborough College.

Honourably Mentioned.—C. A. Spring Rice, Eton College; H. Perrin, Clifton College; H. H. Hancock, Bristol Grammar School; W. D. Thomson, Clifton College; H. M. Platnauer, City of London School.

POLITICAL GEOGRAPHY (Examiner, Sir RUTHERFORD ALCOCK, K.C.B., D.C.L.).

Gold Medal.—Sidney H. B. Saunders, Dulwich College.
Bronze Medal.—William C. Graham, Eton College.

Honourably Mentioned.—J. Vans Agnew, Marlborough College; W. M. H. Milner, Marlborough College; J. F. Heyes, Liverpool College, D. G. Crawford, Cheltenham College; T. Knox, Haileybury College; A. S. Moriarty, Brighton College.

ADDITIONAL NOTICE.

(Printed by order of Council.)

THE following Report gives the results of the deliberations of the Arctic Committee which was appointed by the Admiralty to organize the Arctic Expedition of 1875. It is here published in continuation of the record of events leading up to the dispatch of the Expedition which has been given from time to time in our 'Proceedings.'*

REPORT OF THE ARCTIC COMMITTEE OF THE ADMIRALTY.

ADMIRALTY, Whitehall, 4th February, 1875.

IN pursuance of the instructions of the Lords Commissioners of the Admiralty, conveyed to us in their Secretary's letter dated 24th November, 1874,† the Committee have held nineteen meetings between the 1st December,

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* *Vide* 'Proceedings,' vol. xix. p. 39; vol. xviii. p. 553, &c.

† SIR, ADMIRALTY, 24th November, 1874.

My Lords Commissioners of the Admiralty consider it necessary to appoint a committee of experienced officers who have served in the Polar Regions, to aid them in the consideration of the following points, in connection with the proposed expedition to the North Pole:—

I. The scope of the proposed Expedition.
II. The orders which should be given for organizing and carrying it into effect.
III. The description of the ships to be employed.
IV. The most suitable place for winter quarters.
V. The various kinds of stores, provisions and clothing which will be required.
VI. The preparation of boats, sledges, fittings, &c.
VII. Whether dogs should be employed.
VIII. The selection of Ice Masters, Quartermasters, &c.
IX. The sanitary arrangements best calculated to preserve the health of officers and men of the Expedition.
X. A general consideration of all details in regard to the Expedition itself.

2. My Lords being desirous of availing themselves of your Arctic experience, have directed me to request that you will serve on the proposed Committee, in conjunction with the under-mentioned officers, viz.:—

Rear-Admiral Sir L. McClintock.
Rear-Admiral Sherard Osborn, C.B.

3. The Hydrographer of the Navy will be placed in communication with the Committee, and will be directed to afford all information in his power in regard to hydrographical questions, and the provision of the necessary scientific instruments.

4. The Controller of the Navy, the Director-General of the Medical Department, and other heads of Departments, will be also directed to afford the

1874, and the 4th of February, 1875, and have the honour to report as follows on the several points submitted for their consideration :—

I. The scope of the proposed Expedition.

II. The orders which should be given for organizing and carrying it into effect.

III. The description of the ships to be employed.

IV. The most suitable place for winter quarters.

The foregoing points I., II., III., IV., are so intimately connected that the Committee propose to deal with them collectively, and without adhering to the order in which they occur.

Description of Ships.

1. The ships to be employed for the main Expedition should be two screw steam vessels, strengthened and fitted for Arctic service, and capable of carrying coal for fuel, provisions, stores, &c., for at least three years, for a complement of about sixty to each ship, and as much coal for steaming purposes as circumstances will admit of, without being too deeply immersed. The two vessels selected by the Admiralty on the recommendation of the Committee, viz., H.M.S. *Alert*, and the sealing ship *Bloodhound*, appear to be in all respects suitable for the service.

2. It appears desirable, as a measure of precaution, that 50 or 60 tons of coal should be sent to Disco, for the use of the Expedition, either in one of the whaling vessels which start earlier than the Polar ships, or in a hired transport.

3. Should the Expedition not have returned to England by November, 1876, a third ship should be prepared and strengthened, to leave England in the spring of 1877, to be placed as a depôt and relief ship at some position to be decided upon near the entrance of Smith Sound, probably inside Lyttelton Island ; her special duties, and the instructions to be given her Commander, will be referred to hereafter.

Scope of the Expedition.

4. The scope and primary object of the Expedition should be to attain the highest northern latitude, and, if possible, to reach the North Pole ; and from winter quarters to explore the adjacent coasts within the reach of travelling parties. The limits of ship navigation should be confined within about the meridians of 20° and 90° of west longitude.

The Route.

5. The route by Smith Sound appears by far the preferable one to adopt, for the following reasons :—

a. Its southern entrance, in the latitude of 78°, has been found free from

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Committee all the information and assistance in their power, with reference to the subjects relating to their respective departments.

5. My Lords are desirous that the Committee should commence their consultations at once, and propose that they should assemble at this office on Tuesday next, the 1st December, at 11 A.M.

I am, Sir, your obedient Servant,
(Signed) ROBERT HALL.

Rear-Admiral G. H. Richards, C.B.

Similar letters to the foregoing were also addressed to Rear-Admiral Sir L. McClintock, Kt., and Rear-Admiral Sherard Osborn, C.B.

ice by the several vessels which have visited it since 1852; of late years the sound has been penetrated for a considerable distance by American exploring expeditions, notably by Hall, who reached and wintered beyond the 81st parallel without much difficulty, and the vessels comprising these expeditions were far inferior in power and equipment to those which will compose the present.

b. Smith Sound is known to have a continuous coast-line on either side up to the parallel of about 82°, the highest point yet reached, with comparatively well determined points, where records of the progress of the expedition could be deposited and depôts of provisions placed, if necessary. There are likewise the Danish settlements on the west side of Greenland to fall back upon by boats should the Expedition be hard pushed, and the steam whalers frequent a high altitude in Baffin's Bay every summer.

c. This route, moreover, offers the best—indeed the only—promise of a continuous coast-line stretching far northwards, and upon this fact the prospect of reaching the Pole by travelling parties mainly depends. It is the only route, so far as our knowledge extends, where the operations of an expedition can be confined within such limits that succour would be reasonably certain of reaching it.

d. Finally, animal life has been found to exist to a considerable extent in the highest latitude yet reached up Smith Sound,—an advantage which cannot be over-estimated as regards the health and comfort of the crews; and, as a matter of fact, Esquimaux are found up to the entrance of Smith Sound, who appear to have a knowledge of regions to the northward; and it is possible that some of their race may be found to exist in a higher latitude than has yet been attained.

Orders to be given.

6. It appears, from experience hitherto gained, that the final departure of the Expedition from England may be deferred until the middle of June, though an earlier date, if the equipment of the ships can be hastened, may be desirable in the interests of scientific research.

The ships should proceed to Disco, in Greenland, where they would touch, as well as at the settlements of Proven and Upernivik for dogs, Esquimaux drivers, &c., and then pass up to Smith Sound in the prosecution of the enterprise.

7. Both shores in the vicinity of Capes Isabella and Alexander should be examined, in order to select a suitable position for the depôt or relief ship to be despatched in 1877; but as such a position cannot be absolutely determined on beforehand, and it is necessary to decide where information will be found by any ship which may be subsequently sent out from England, Lyttelton Island, in our opinion, meets all the requirements of a fixed point for rendezvous. Here a conspicuous cairn should be erected; one record placed in the cairn, another laid beside it, and a third buried 20 feet due north of it. These records should contain proceedings of the voyage and such information as may be necessary for the commander of the ship to be despatched in 1877.

8. The ships should then proceed up Smith Sound with all speed, so long as its navigation is not seriously obstructed by ice, carefully scrutinizing its shores for places of security for the ships, and stopping only to erect cairns on such conspicuous points as may be conveniently landed on. Similar information should be placed at these cairns, and after the same method as described for the cairn on Lyttelton Island. The commander will not fail to bear in mind, that these records of his progress and of any change of plans he may have found necessary to make, form an important feature in his *instructions*.

It is desirable that these cairns should not be more than 60 miles apart. By way of illustration, we would name Capes Frazer, Back, and Beechey on the western shore, and Capes Jackson and Bryan on the eastern shore; to these prominent headlands the attention of any searching party would naturally be directed. A small depôt of provisions and a boat might also be advantageously left at one or more of these points, to serve either for exploring parties or to aid in the event of an abandonment of the ships.

9. The general design of the voyage should be, that while both ships would share as far as possible in the objects of discovery and exploration, one must be so placed that she would not only serve for the crew of the other to fall back upon, but also, that the united crews could, without doubt, escape from her to the relief ship at the entrance of Smith Sound, by means of their sledges and boats over the ice.

Consequently, the second ship must not be carried northward of the 82nd parallel; such a position would secure this most important object, and also afford every prospect of exploration into very high latitudes.

10. The eastern or the western shore may be selected for her winter quarters according to circumstances; the advantages of the former are, that animal life has been found to exist there throughout the winter, and that the ship would be favourably placed for exploring the northern coast of Greenland or adjacent land in the spring of 1876; on the other hand, if continuous land on the western shore is found, it may, in the judgment of the officer in command, afford a counterbalancing advantage, in the greater facility and security of communication between the ships, and their co-operation in subsequent operations; this point must, therefore, be left to him to decide: if he should select the western shore, then he would be careful to leave a record on the eastern side of the probable position of the second ship; and in the absence of any conspicuous cairn, a ship or party visiting the bay wintered in by the *Polaris*, in about 81° 35′ north, would naturally seek the position of Hall's grave, where, and at 20 feet due north of it, records would be expected to be found.

11. The commander of the second ship, wherever placed, would follow such instructions as he received on parting company, or subsequently, from the officer commanding the Expedition.

12. It should be a matter for consideration, whether, before parting, the leader would leave a depôt of some six months' provisions with the second ship, in the event of his own crew having to retreat, but time and circumstances must govern his decision on this point.

13. Having assured himself of the safety of his second ship, and increased his own crew by such portion of hers as he may deem necessary to enable him to accomplish a sledging attempt to reach the Pole, this being the main feature of his voyage, and also the exploration of his share of the coast-lines extending northwards, the leader of the expedition should then push on northward, and explore by ship, as much of the unknown area as the season and the state of the ice would permit. But it is not contemplated that the two ships should winter at a greater distance apart than about 200 miles; and the officer in command, if he advance with his ship beyond that point in 1875, should use his best endeavours to return within the 200 miles distance, or the case may arise in which it may be even wise to rejoin his consort, and unite their forces for exploration in the spring and summer of 1876.

14. Should the advance ship, after leaving her consort, carry continuous, or nearly continuous land up to a high northern latitude, the officer in command should avail himself of opportunities to land small depôts of provisions at intervals, with cairns and records as already described; and also to deposit at the most northern station a depôt of provisions and a boat, for his spring *travelling* parties.

15. In the absence of continuous land, it must not be lost sight of that sledge travelling has never yet been found practicable over any considerable extent of unenclosed frozen sea, although conditions may be found to exist which would enable parties to travel for limited distances by sledge and boat operations combined, and for this purpose the best boats and sledges that can be devised have been supplied. The leader having increased his own crew by such portions of the crew of the second ship as he may deem necessary, it is expected that he will have at least six strong sledge parties and four dog sledges.

In early spring his sledge exploration will commence, and all these parties should be employed in the first instance to push out the North Pole party (which should be provided with at least one boat), and upon return from this work, some weeks later, the parties for the exploration of the coast-lines should be sent out.

16. It must be left to the officer in command to furnish ample instructions to his second, especially in regard to the explorations to be undertaken by him during the spring and summer of 1876, should the ships winter apart; and in this event, the first consideration should be, in the autumn of 1875 or early spring of 1876, to ascertain their respective positions; this, unless under very unfavourable conditions, would be probably accomplished by dog parties, without interfering much with the objects of exploration.

In connection with this subject the leader should bear in mind the necessity of giving such instructions as would govern his proceedings in the event of this proving to be a final separation.

17. It will be impossible to give any positive or detailed instructions for the guidance of the officer in command of the Expedition after quitting his consort, further than that he should use his best endeavours to rejoin her in the navigable season of 1876, and in company with her return to England, provided his spring exploration has been reasonably successful. But in the event of another season being absolutely required to complete a reasonable amount of exploration, still it will be a matter for his careful consideration, whether it would not be advisable that the advanced ship should fall back towards her consort from any advanced position she may have wintered at; and should it still remain doubtful whether a final retreat could be effected, the second ship might not be moved southward to such a position as would secure it.

18. In 1877 the leader should be at full liberty to abandon his ship as early as convenient, if, in his opinion, the explorations of the preceding year had been final, or, if from his experience of the navigable seasons of 1875–76 that her escape in 1877 would be doubtful; and he should so time this abandonment as to reach the relief ship at the entrance of Smith Sound not later than the first week in September, 1877.

In the event of his remaining out in the hope of extricating his own, or it may be both ships, during the summer of 1877, he should consider the propriety of reducing his own or both crews to a minimum, sending away all that can be spared to the relief ship at Lyttelton Island.

In this case one or both ships would remain out for the winter of 1877, if unable to extricate themselves in the summer of that year, a contingency which is hardly possible.

It is not desirable, under any circumstances, that a single ship should be left to winter in the Arctic regions. If one ship remains up Smith Sound, a second ship should remain at the rendezvous at its entrance.

19. It does not appear that any more definite instructions, than are embraced in the foregoing remarks, can be furnished to an officer already familiar with Arctic service, although there are many important points and details to which it might be desirable hereafter to direct his attention. With the ample *means at his command*, he may vary the detail according to circumstances,

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now believe that they have fully considered and reported it points submitted to them, and as much of the detail as at this early period of the outfit of the Expedition; but to point out, that their labours have been carried on, for ng the absence of the leader of the Expedition on foreign but the main points laid down by the Admiralty for his guidance can always be kept in view, and all other objects should be subordinate to them.

20. He will be aware that in the summer of 1877, a relief or depôt ship will be despatched to Smith Sound, and that she will take up, if possible, a position to be agreed upon with him before his departure from England, subordinate to any suggestions which may be deposited in the cairn at Lyttelton Island. The instructions to this ship, so far as they need be decided on at present, should be to be found at the rendezvous agreed upon not later than the last week in August 1877. She should be equipped and fitted for wintering in the Polar Seas, and, in the event of there being no tidings of the expedition nor instructions to the contrary, in the records to be found at the rendezvous, she should be ordered to winter at the position agreed upon.

21. If, under the circumstances alluded to in paragraph 18, the retreating parties should arrive at Lyttelton Island in 1878 and find no relief ship there, or no intelligence of her, it will be taken for granted that some unforeseen accident has prevented her reaching Lyttelton Island, and in that case the retreating parties must rely on their own resources for reaching Upernivik, looking out, of course, for the whalers on their fishing-grounds between the months of May and August. The Expedition will, in any case, on its return revisit the cairn on Lyttelton Island and leave records.

22. There is one other point which it may not be out of place briefly to refer to, notwithstanding that the officer in command is an experienced nautical surveyor, and it is this, that no minute surveys are necessary, nor, on an expedition of this character are they possible. As a rule, the requirements of hydrography and geography will be amply provided for, if the principal points discovered are determined with all the accuracy attainable, and the prominent features and general outline of the shores sketched in as faithfully as time and circumstances will admit, soundings being obtained when practicable.

23. The scientific memoranda furnished by the Societies at the request of the Admiralty should be supplied to the commanding officers, with instructions that the various suggestions therein contained should be carried out as far as circumstances will admit.

24. Should the season of 1875 be so unfavourable as to prevent the Expedition from penetrating beyond the 79th parallel, it is for their Lordships to decide whether the ships should winter there or return to England and renew the attempt the following year.

V. The various kinds of stores, provisions, and clothing which will be required.

With the assistance of the two officers placed at their disposal by their Lordships, viz., Dr. David Lyall, Deputy Inspector-General of Hospitals and Fleets, and Mr. James Lewis, Paymaster R.N., both of whom have had considerable experience in Arctic service, the Committee have carefully considered all points connected with the provisions and clothing, and have decided on the species and quantities of each to be supplied to the Expedition, together with scales of daily issue of the former, subject of course to any modification which the officer in command may from time to time feel it desirable or necessary to make. Lists also of the various kinds of stores requisite for the equipment of the *Alert* and *Bloodhound* for Arctic service have been drawn up.

VI. The preparation of boats, sledges, fittings, &c.

The construction of the boats has been considered with a view to their employment on ordinary service, to their adaptability for navigating among ice and to their portability for carrying on sledges, and their numbers have been determined on the principle, that they should conveniently carry the whole of the crews, with ample provisions, under any contingencies which can be provided against. In regard to sledges, the numbers have been determined on, viz., about twenty-six for both ships, and their construction is left to Sir Leopold McClintock, under whose superintendence the Expedition is being fitted at Portsmouth.

VII. Whether dogs should be employed.

The Committee are of opinion that dogs could be employed with advantage for auxiliary travelling and other purposes, and that with this view arrangements should be made with the Danish Government for providing a certain number of those animals, together with Esquimaux drivers, interpreters, &c., at the settlements on the Western Coast of Greenland, where the ships would call for them.

VIII. The selection of ice-masters, quartermasters, &c.

The Committee recommend that the practice adopted in former expeditions be adhered to, viz., that three ice-quartermasters be attached to each ship, and that they be selected from the crews of the whaling vessels at the northern ports of the United Kingdom.

IX. The sanitary arrangements best calculated to preserve the health of officers and men of the Expedition.

The Committee are of opinion that the precautions most conducive to health and comfort on an expedition of this character are, first, that the officers and crew should be selected with a due regard to their age and physical fitness; and, secondly, that they should be liberally supplied with the best provisions which can be procured, antiscorbutics and medical comforts, as well as suitable clothing.

Upon these points, especially as regards the provisions, the Committee have been guided by their own experience with expeditions under the late Captain Austin and Sir Edward Belcher, in the years 1851–2–3–4, as well as the evidence of several of the seamen who served in these expeditions, and whom they have called before them.

The equipment of ships for Arctic service is now so well understood, that the Committee have not thought it necessary to offer any special sanitary suggestions on this point (the more especially as the ships of the present Expedition are being fitted and equipped under the personal superintendence of their experienced Arctic colleague, Rear-Admiral Sir Leopold McClintock), further than that all possible measures should be taken to secure warmth, ventilation, and the absence of condensed vapour from between decks.

X. A general consideration of all details in regard to the Expedition itself.

Many of the details connected with the Expedition have necessarily been mixed up and considered with the main points submitted to the Committee by their Lordships, and will be found recorded in the daily minutes of proceedings, but the most important of the detailed arrangements will be connected with the travelling and sledge equipments, which must be carried out at the port where the ships are being fitted out, under the superintendence of Sir Leopold McClintock, aided by the officers of the Expedition.

The Committee now believe that they have fully considered and reported on all the important points submitted to them, and as much of the detail as can be decided on at this early period of the outfit of the Expedition; but they would desire to point out, that their labours have been carried on, for the most part, during the absence of the leader of the Expedition on foreign service; now that Captain Nares has returned to England, and during the progress of the equipment, some modifications of the Committee's views on minor, or even material points, may be found desirable as circumstances develop themselves; and in the event of any such modifications being found necessary, they would suggest that they should form a supplement to this Report, in order that a concise and comprehensive record should be preserved of all matters connected with the equipment of the Expedition, up to the date of its departure from England. Such a record, if further supplemented by a precis of the correspondence which may arise during the fitting out of the Expedition, would be of great service should it become necessary to equip a relief ship in the winter of 1876–77.

Though the Committee believe their own labours are ended, they would suggest that the services of the two officers who have been associated with them—Dr. Lyall and Mr. Lewis—should be retained for the present, and until the different articles of provisions, clothing, &c., which have been ordered to be prepared, are delivered over into the store, in order that they may examine and certify as to their fitness for the service.

Finally, the Committee would desire to acknowledge the ready assistance and courtesy they have received from the heads of Departments and the officers with whom their Lordships have placed them in communication. With the heads of the Contract and Victualling Departments, the Committee have been in daily communication, and nothing could exceed the readiness with which these gentlemen and their staff have met their views and wishes in every respect.

Geo. Henry Richards, *Rear-Admiral.*
F. L. McClintock, *Rear-Admiral.*
Sherard Osborn, *Rear-Admiral.*

Wm. Blakeney, *Paymaster*, R.N.,
Secretary to Arctic Committee.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[Published July 13th, 1875.]

SESSION 1874-75.

Twelfth Meeting, May 10*th*, 1875.

[The paper announced for this evening was "On Arctic Sledge Travelling," by Rear-Admiral Sir Leopold M'Clintock; but in consequence of the sudden death of Admiral Sherard Osborn, on Thursday, May 6th, the Meeting was not held.]

Thirteenth Meeting (Anniversary), *May* 24*th*, 1875.

Major-General Sir HENRY C. RAWLINSON, K.C.B., President, in the Chair.

Elections.—*M. Albert Bencke, Esq.*, M.A.; *M. Pierre Savorgnan de Brazza; James Francis Cobb, Esq.; Eccleston Du Faur, Esq.; James Hart, Esq.; Louis Arthur Lucas, Esq.; The Duke of Manchester; George Norton, Esq.; Myles Patterson, Esq.; Rev. William James Woods*, B.A.; *Alfred B. Wyon, Esq.*

The Secretary, Mr. C. R. Markham, read Section I., Chapter V., of the Regulations, relating to the Anniversary Meetings of the Society.

The Minutes of the last Annual Meeting having been read, the President appointed Captain Felix Jones and the Rev. R. J. Gould as Scrutineers of the Ballot about to take place.

After which, the Secretary read the Report of the Council for the year. The adoption of the Report was moved by Visconde

DUPRAT, seconded by Captain GRIFFITH JENKINS, and carried without dissent.

The PRESIDENT then proposed the addition of the following sentence to Par. 2, Sect. 3, Chap. V., of the Regulations:—

> "But the Council is empowered to restrict the privilege of admission to one friend for each Member, whenever such restriction seems to them absolutely necessary."

This alteration in the Rules governing the admission of visitors to the Evening Meetings, he said, was proposed in the interest of the Society generally, because, on certain special occasions, Fellows had been unable to obtain seats, owing to the large number of visitors present. He hoped that the rule would meet with general approbation.

The proposal was agreed to without dissent.

The presentation of the Royal Medals and other Awards next followed.

PRESENTATION OF THE ROYAL AND OTHER AWARDS.

ROYAL MEDALS.

THE Gold Medals entrusted to the Society for the encouragement of Geographical science and discovery were awarded this year as follows:—

The Founder's Medal to Lieutenant Weyprecht, of the Austrian Navy, for the enterprise and ability he has displayed in the command of two expeditions to the sea between Spitzbergen and Nova Zembla; for his discovery of new lands in the same sea; and for the numerous and valuable scientific observations made during his voyages.

The Patron's Medal to M. Julius Payer, for the great service he has rendered to Geography by his explorations and discoveries in the Arctic regions; first, as member of the North German Expedition of 1869–70, in East Greenland, and afterwards, as second in command to Lieutenant Weyprecht, in the two Austrian Expeditions to the Nova Zembla Sea of 1871 and 1872–4, during the latter of which he led the sledge-party in exploring the coasts of the newly-discovered Franz-Josef Land.

His Excellency the Count von Beust, Austro-Hungarian Ambassador, attended to receive the Medals in the absence of Lieutenant Weyprecht and M. Payer.

The PRESIDENT addressed Count von Beust as follows:—

"EXCELLENCY,

"In the unavoidable absence of the officers to whom the Royal Geographical Society has this year awarded its Medals, I am proud to be permitted to deliver them into the hands of a statesman so well known and so universally respected throughout Europe as yourself. And I will venture to observe that the occasion is one which, from its very exceptional character, is the more worthily associated with your Excellency's name, since it is the first time during a long series of years that the Council of the Royal Geographical Society, weighing the claims of travellers in all parts of the world, has decided to award both its Medals to members of the same Expedition, that Expedition moreover led by Austrian officers and supported by the private munificence of Austrian subjects, not only bearing honourable testimony to the maritime enterprise of the nation which you so ably represent, but having also achieved the most important Geographical discovery of modern times. Lieutenant Weyprecht, of the Austrian Navy, and Lieutenant Payer, of the Austrian Military service, have been associated for several years past in Arctic exploration. Their first joint enterprise was in the year 1871, when, embarked in a small sailing-vessel of only 40 tons measurement, they extensively explored the sea between Spitzbergen and Nova Zembla, and actually reached the very high latitude of 79° N., bringing back to Europe such a favourable account of the navigability of this part of the Arctic Ocean, that the screw-steamer *Tegethoff* was fitted out in 1872 and sent to continue the exploration. It is this last Expedition—in which Lieutenant Weyprecht commanded and Lieutenant Payer led the sledge-parties on shore—that has mainly earned the Medals of our Society, granted for important services rendered to Geographical science; for not only was a new and extensive land discovered to the north-east of Spitzbergen, to which the name has been given of Franz-Josef Land, but under circumstances of extreme difficulty, owing to the imminent danger which threatened their ice-bound vessel, a series of scientific observations were made and recorded by the officers of the *Tegethoff* as valuable as any ever before obtained in an Arctic voyage. The greatest credit also is due to Lieutenant Weyprecht for his able and thoughtful management of the crew committed to his charge, for his maintenance of discipline, and his attention to the health and comfort of his men, during the two winters that his vessel remained imbedded in the ice; and, finally, for the resolution and skill with which, when the extrication of the *Tegethoff* from the ice was manifestly impossible, he abandoned the ship and succeeded, by means of boats and sledges, in conveying his party in safety to Nova Zembla.

"Lieutenant Payer was distinguished as an Alpine explorer before he joined the North German Expedition to East Greenland in 1869. On that occasion, however, he gained fresh laurels, having led the sledge-parties from the *Germania* in the spring of 1870 beyond the 77° of north latitude, and having contributed two excellent chapters and portions of others to the account of the voyage which was published on the return of the Expedition to Europe. In 1871 he was again employed in the first Austrian Expedition to the Nova Zembla Sea, and ably seconded Lieutenant Weyprecht in that navigation, when they reached 79° N. before they were obstructed by the ice. Lieutenant Payer's great and crowning services, however, as an Arctic explorer have been rendered in connection with the recent voyage of the *Tegethoff*. During that voyage, in the early spring of 1874, and after being imprisoned for two winters in the ice, Lieutenant Payer landed on Franz-Josef Land, and commenced a sledge-journey of 17 days to the north, during which he not only laid down the outline of a large extent of hitherto unknown land, but he ultimately reached Cape Fligely, in 82° 5′, and from that elevated point, about 1500 feet high, he traced the coast-line as far as 83° N., where a remarkable headland, named Cape Vienna, formed the western extremity of a country which he called Petermann Land, after the famous geographer of Berlin. Lieutenant Payer subsequently rejoined his vessel 160 miles to the south in safety, and accompanied his commander on their return route to Europe.

"By general consent, this expedition conducted by Lieutenants Weyprecht and Payer is one of the most remarkable that has ever been made in the Arctic regions. It has especially attracted our admiration in this country as a noble instance of combined daring, skill, and endurance. We are further indebted in some degree to its successful termination for having stimulated our own Government to send forth the *Discovery* and *Alert*.

"We sincerely congratulate Austria on the achievements of her gallant children, and I request your Excellency, in presenting the Founder's Medal to Lieutenant Weyprecht and the Patron's Medal to Lieutenant Payer, to assure them that their English brethren hail them with cordiality and joy as worthy fellow-labourers in our common field of geographical discovery and research."

Count von BEUST, in accepting the medals, said he fully appreciated the great honour which had been conferred upon him. He was most sensible of the kind and flattering terms which the President had used, and his countrymen would be proud of such testimonials from so eminent a Society. He was equally grateful to the Society and to his countrymen: to the latter first, on account of the lustre they had added by their deeds to Austro-Hungary, and next, because it was to them he was indebted for the kind and friendly reception he had met with in this distinguished assembly. The medals were a substantial pledge of the appreciation which was felt in this country for the labours of his countrymen; and he was acting in accordance with the wishes of both his Government and his countrymen when he tendered their sincerest good wishes for the success of the brilliant and gallant Expedition which was so soon to set sail from these shores, to carry England's "Union Jack" and her brave sailors to the far north.

OTHER AWARDS.

A GOLD WATCH was presented to Mr. W. H. Johnson, in acknowledgment of the services rendered to Geography by his survey-journey in 1865 across the Kuen-Luen to Ilchi in Khotan, and for the aid subsequently rendered to Sir D. Forsyth's Expedition whilst resident at Ladāk.

Colonel T. G. Montgomerie, of the Trigonometrical Survey of India, attended to receive the watch on behalf of Mr. Johnson.

The PRESIDENT addressed Colonel Montgomerie as follows:—

"Sir, I have the honour to hand to you, as representing the Great Trigonometrical Survey of India, a Gold Watch, which has been awarded by the Council to Mr. W. H. Johnson, who was formerly attached to the Survey, for the great services which he has rendered to Geography—

"1stly. By his visit to Khotan in 1865, when he approximately fixed the position of that important city, and was the first Englishman who ever crossed the Kuen-Luen into the plains of Tartary.

"2ndly. By his constant efforts, in his position as Commissioner of Ladāk under the Maharaja of Cashmere, to promote independent exploration, and especially by the aid he afforded Sir D. Forsyth in the recent passage of his Mission viâ Leh to Yarkand and Kashgar.

"As Mr. Johnson began life as one of your own employés it will be gratifying to the Council if you will undertake to present him with this watch, as a mark of our appreciation of his services, and if you will assure him of the lively interest we shall take in his future career on that extreme frontier of our Indian empire where his lot is cast."

Colonel MONTGOMERIE replied:—

"Sir Henry Rawlinson, Ladies, and Gentlemen:—I have much pleasure in receiving this watch for Mr. Johnson, knowing, as I do, how well he has deserved such an honour from this learned Society.

"I am proud to think that one of my assistants on the Survey of the Northern Frontier of India has been selected for such a testimonial, looking on it, as I do, as the meet reward for much hard work in purely geographical research among the upper valleys, peaks, and glaciers of the Himalayas. Such a recognition of his services is, at the same time, a compliment to the Trigonometrical Survey of India, to which he had formerly the honour to belong.

"I regret Mr. Johnson is not here in person, for I feel sure that he would have expressed his grateful thanks much better than I can for him. He is, however, unavoidably absent, having had to return to India.

"I know he will greatly value this recognition of his services, this token of his having done good work in the cause of Geography: he will thoroughly appreciate it, and will, I know, treasure it as an heir-loom.

"A surveyor and explorer from boyhood, nothing can gratify him more than such a mark of approval from this Society, which is chartered to decide upon all geographical questions.

"As a mountaineer, Mr. Johnson was always conspicuous: no height, no amount of snow or ice, were sufficient to deter him if an ascent was necessary; and the number of trigonometrical stations which he established at over 20,000 feet was quite extraordinary.

"Those who visit Ladāk—now a possible summer-trip from London—would be able to see one of the masonry platforms from

Leh, the capital, which was erected by Mr. Johnson's survey party on a peak of the range opposite, and west of that town, at a height of 21,500 feet above the sea. With a telescope there is no difficulty in tracing the artificial arrangement of the stones, and until quite recently a flag-staff, which was erected over it, was also visible, but has since, I believe, been destroyed by lightning. Those who like to try the effects of such an altitude will find the regular Trigonometrical mark engraved on the centre stone of the pillar.

"The occasion of Mr. Johnson's ascending to 22,300 feet, was owing to his inability to get at a valley in any other way except by crossing a ridge which reached this altitude. He actually forced his way over, and was obliged to spend the night at nearly 22,000 feet above the sea, darkness having come on before he got any lower.

"I know this award will be an incentive to Mr. Johnson's farther exertions in all geographical matters, and as this watch is one that will keep good time, I trust that with it Mr. Johnson may himself have an opportunity of determining some further geographical problems for this Society.

"Again thanking you most heartily on behalf of Mr. Johnson for the honour you have conferred on him, I have only to add that I will do my best to see that it is conveyed to him as safely as possible, though it will be no very easy matter, as it cannot reach him till he has again crossed the Himalayas, and reached his distant residence in Ladāk, some 20 marches beyond that great range of mountains."

PUBLIC SCHOOLS' PRIZE MEDALS.

The Hon. G. C. Brodrick, at the invitation of the President, addressed the Meeting on the subject of the Public Schools Prizes' Examination of the present year. He said the Special Subject for the year 1874–5 was China; General R. Strachey being Examiner in Physical, and Sir Rutherford Alcock Examiner in Political Geography. The award of the Examiners was as follows:—

Physical Geography. *Gold Medal.*—Henry Alexander Miers, Eton College. *Bronze Medal.*—Archibald Edward Garrod, Marlborough College. *Honourably Mentioned.*—C. A. Spring Rice, Eton College; H. Perrin, Clifton College; H. H. Hancock, Bristol Grammar School; W. D. Thomson, Clifton College; H. M. Platnauer, *City of London School.*

POLITICAL GEOGRAPHY. *Gold Medal.*—Sidney H. B. Saunders, Dulwich College. *Bronze Medal.*—William C. Graham, Eton College. *Honourably Mentioned.*—J. Vans Agnew, Marlborough College; W. M. H. Milner, Marlborough College; J. F. Heyes, Liverpool College; D. G. Crawford, Cheltenham College; T. Knox, Haileybury College; A. S. Moriarty, Brighton College.

This was the seventh year in which these examinations had been held, and it was a most gratifying fact that, although the average standard of attainment had not always been as high as could have been wished, there never had been wanting candidates worthy, in the opinion of the Examiners, to receive both the Gold and the Bronze medals in both divisions. At first sight, the total number of candidates (nineteen in each subject) might appear rather small; but he thought it was as great as could be expected, for boys at public schools were now almost distracted with the multiplicity of examinations, and nineteen would be considered a very respectable number of competitors for a college scholarship at either of the Universities. Nor should it be forgotten that the Special Subject chosen for the year required a good deal of preparation outside the groove of the ordinary school studies. It was very satisfactory to learn, as the Council had done, that so many of the successful candidates in previous examinations had distinguished themselves in other studies at the Universities and elsewhere; and he had always maintained that preparation for the general Geographical papers was as good an investment of time as a boy at a public school could make, whether for the Universities, the Army, or the Civil Service. So much could scarcely be said for the Special Subject each year, which, however, was the characteristic feature of the examinations, and he ventured to doubt whether any Geographer present, however eminent, would stand much chance in the competition, without devoting a great deal of time to special preparation, against the successful candidates of the year.

The Special Subject for next year was the Arctic Regions. The physical geography of the Arctic Regions had a great interest of its own, and Mr. Major had shown how much was to be said on the political geography in connection with the various migrations and settlements along the coast of Greenland. But this was not the only reason which had influenced the Council in the selection of the subject; for it was felt to be a natural and a wholesome thing for the young geographers of our public schools to be associated with the whole country in sympathetic interest in that expedition which was just about to leave our shores, so that they might follow the movements of Captain Nares and his comrades on their perilous voyage across the Polar Seas, and stand with them, in imagination at least, on that central point, 90° N. latitude and no longitude at all, where it was hoped and believed the new expedition would succeed in planting the British flag.

In presenting the Gold Medal for Physical Geography to Mr. H. A. Miers, the PRESIDENT said: "I am very happy to present you with the Gold Medal for Physical Geography. You have had one of the first physical geographers in the world for your examiner, General Strachey, and having attained the Gold Medal under his inspection is a very great honour indeed. I am happy to find that you have an hereditary connection with science: your grandfather's reputation as a Botanist is known all over the world, and I trust this will be an incentive to you to emulate that reputation."

Addressing Mr. Garrod, the PRESIDENT spoke these words:—"Allow me to present you with the Bronze Medal for Physical Geography which you have earned this year. I believe you also are connected with science, your brother being well known as a physiologist. I trust that that will be an incentive to you to further exertion in scientific studies in future."

Next addressing Mr. S. H. B. Saunders, the PRESIDENT said: "I am very glad to present you with this Gold Medal for Political Geography. Sir Rutherford Alcock, one of our Vice-Presidents, whose past official connection with China rendered him master of the Special Subject of the year, as far as Political Geography was concerned, was your Examiner, and it is a great honour for you that he reports most favourably of your work. I think that on a previous occasion also you were honourably mentioned, and it is very satisfactory now to find that you have obtained the Gold Medal as a reward of persevering in the same course."

Addressing Mr. Graham, the PRESIDENT said: "I present you with this Bronze Medal for Political Geography. I congratulate you on having obtained it. I congratulate Eton College also on again having come to the front, and sent to us a prizeman for both Political and Physical Geography. I say nothing in disparagement of the other schools, but it must be very satisfactory to all Etonians to find their old college coming to the front in this manner, and sending prizemen for the Geographical Medals."

The Ballot for the Council was then taken, and the result declared as follows (the names in Italics being those of the New Councillors, and those who change office):—

President: Major-General Sir H. C. Rawlinson, K.C.B., &c. *Vice-Presidents:* Sir Rutherford Alcock, K.C.B., &c.; Admiral Sir George Back, D.C.L.; Vice-Admiral Sir R. Collinson, C.B.; *Lord Cottesloe.* *Trustees:* Lord Houghton, D.C.L., F.R.S.; Sir Walter C. Trevelyan, Bart. *Secretaries:* Clements R. Markham, Esq., C.B., F.R.S.; R. H. Major, Esq., F.S.A. *Foreign Secretary:* Lord Arthur Russell, M.P. *Councillors: John Ball, Esq.*, F.R.S.; *Sir T. Fowell Buxton, Bart.;* Sir George Campbell, K.C.S.I., M.P.; Captain F. J. O. Evans, R.N., C.B.; James Fergusson, Esq., F.R.S.; *Right Hon. Sir H. Bartle Frere*, K.C.B.; Vice-Admiral Sir William H. Hall, K.C.B.; Major-General Sir Frederic J. Goldsmid, K.C.S.I.; *Francis Galton, Esq.*, F.R.S.; M. E. Grant-Duff, Esq., M.P.; *The Duke of Manchester;* John Murray, Esq.; Sir Charles Nicholson, Bart., D.C.L.; Vice-Admiral E. Ommanney, C.B., F.R.S.; General C. P. Rigby; *Admiral G. H. Richards*, C.B., F.R.S.; H. Danby Seymour, Esq.; S. W. Silver, Esq.; *General R. Strachey*, F.R.S.; Sir Harry C. Verney, Bart.; Major C. W. Wilson, R.E. *Treasurer:* Reginald T. Cocks, Esq.

The PRESIDENT announced, further, that the Council had that day elected His Royal Highness the Duke of Edinburgh as Honorary President of the Society, His Royal Highness having expressed his willingness to accept that office, and stated that he should be very happy to attend the meetings of the Society from time to time, and take the chair, on occasions when subjects were discussed which concerned the profession with which he was connected. His Royal Highness would not, as Honorary President, belong to the Council, but would occupy a position next to Her Majesty, the Patron, and the Prince of Wales, the Vice-Patron, of the Society.

The Annual Address on the progress of Geography was then read by the President, after which

Sir G. BOWEN rose to propose a vote of thanks to the President for his exceedingly able and lucid address. It was, he said, personally a great satisfaction to him to return to England after sixteen years' absence, and find the chair which was then so ably filled by Sir Roderick Murchison now occupied by Sir H. Rawlinson. He was quite sure that the meeting would join with him in expressing a hope that Sir Henry would permit his Address to be *printed* and circulated among the members of the Society.

Lord Cottesloe, in seconding the resolution, said he had had more experience than many members present of the services rendered to the Society by the President, having been himself for some years a member of the Council, and the meeting having that day elected him one of the Vice-Presidents. He was able, therefore, to assure the members of the zeal, ability, and wisdom with which Sir Henry Rawlinson transacted the business of the Society.

The Resolution was agreed to.

The President in returning thanks for the vote, said he should do his best during the coming year to conduct the business of the Society as it had hitherto been conducted; but he trusted that at the next anniversary, as he should then have filled the chair for five years, he would be allowed to resign his position into the hands of some younger and more active officer. He had expressed a hope last year that Sir Bartle Frere would resume the chair on the present occasion, and he should still have expressed the same hope, but that in a short time Sir Bartle would leave England for some months, as he had arranged to accompany the Prince of Wales to India, so that it was impossible for him to perform the duties of President this year. He had merely retired from the office of Vice-President in consequence of that engagement, but on his return from India it was to be hoped that he would again resume the high office in the Society which he had formerly held.

ADDRESS

TO

THE ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 24th May, 1875.

BY MAJOR-GENERAL SIR H. C. RAWLINSON, K.C.B., F.R.S.,
D.C.L., LL.D., ETC., PRESIDENT.

GENTLEMEN,

IN meeting you again on this, the 45th anniversary of the Royal Geographical Society, I am happy to be able to congratulate you on our increased and ever-increasing prosperity. You will have learnt from the Report of the Council, which has just been read, that during the past twelve months there has been a net increase of 200 Members, which is the largest addition that has been ever made to our ranks within the limits of the same period; for although last year there were 342 new paying Members, against 295 of the present year, there were also 177 withdrawals, as against 95, so that the balance is 23 in favour of the year now reported on. Our Register now exhibits the imposing total of 3035 Fellows, of whom 2960 are Ordinary and 75 are Honorary, and Honorary Corresponding, Members. Our income has also steadily advanced until it now exceeds 7000*l.* per annum, and if we may judge from the repeated references that are made to us on Geographical subjects from all parts of the world, our reputation and influence have certainly not diminished. It must indeed be a gratifying reflection to the Fellows of this Society that it is mainly owing to the urgent and persistent arguments impressed by your successive Presidents on Her Majesty's Government, and supported by the full weight of your unanimous approval, that the great national undertaking of a Polar Expedition has been at length accomplished. The Council do not take any especial credit to themselves for the success which *has thus* attended their efforts; but they do feel proud, as your representatives, in having contributed to launch an enterprise which, as they believe, will not only yield the most valuable scientific results, but will redound to the honour of England, and will raise still higher the professional character of British sailors.

There are two other points to which I am desirous of calling your attention before proceeding to our regular Report on the progress of Geography. The one relates to our Evening Meetings, which we are still enabled, through the indulgent consideration of the Senate of the University of London, to hold in this handsome and commodious Hall. On all ordinary occasions the accommodation which is here furnished, is ample for our requirements, and the Council would not therefore propose to cancel the rule which permits each Fellow to introduce one gentleman or two lady friends to our Evening Meetings; but on extraordinary occasions the demand for places is so great, that in the interests of the Fellows generally we are obliged to ask for authority to limit, at our discretion, the privilege of admission to such meetings to one visitor to each Member. The Council will not impose this restriction unless they have reason to apprehend excessive crowding; but it is manifestly unfair that the Hall should be filled with visitors to the exclusion of the Fellows, and we trust, therefore, that the compromise now suggested will meet with general approval.

The other point to which I desire to call your attention, and which has, I am sure, given much satisfaction to the Fellows, is the improvement in the publication of our 'Proceedings.' By great assiduity on the part of our Staff, and especially through the activity of our Secretary, Mr. Bates, we have been able before the Anniversary to present the Fellows with five numbers of our 'Proceedings' for the current Session, instead of three numbers, as in former years; not only a larger amount of matter, in an improved form, being thus submitted for perusal, but the further advantage being gained of circulating detailed information of new discoveries among the Fellows while the interest of the subject is still fresh in their memories. The 45th volume of the 'Journal' is also in active preparation, and will probably be finished before the end of the year, the material being of a very varied character, and amply sustaining the reputation which our publications have long enjoyed of furnishing the most complete record of the present state and progress of Geographical knowledge that is to be found in Europe.

Our losses by death during the period under review have been exceedingly heavy, the obituary list commencing with the honoured names of Sir C. Lyell, D'Avezac, and Sir H. Kellett, and closing within these few days with the names of Mr. Findlay and Admiral Sherard Osborn, who, beloved and respected in this Society, were also among the foremost Geographers of the age.

REAR-ADMIRAL SHERARD OSBORN, C.B.—In Sherard Osborn the Society has lost one of its most active and valued members. Devoted to his profession, an ardent geographer, an open-handed yet judicious encourager of enterprise, his bright and genial face will long be missed, and his place among us will not easily be filled. In the half-century that Osborn lived he did his full share of valuable work; and although he turned his hand to many things, yet there was a thoroughness and completeness in all he did which is rarely found combined with that versatility of genius which distinguished our lamented friend. Gifted with rare abilities, capable alike of conceiving great projects and of close and searching attention to minute details, endowed with warm sympathies and with an unusual power of attracting the devoted affection of those with whom he worked, he, through life, brought all the powers of his mind to bear on one object, which he sought in many ways. He loved his profession with a pure and unselfish devotion, and he saw how closely the best interests of the Navy were connected with the objects of this Society. Hence it was his perception of what was most conducive to the good of the Navy that led him to become an ardent geographer. He saw that in time of peace, exploration and discovery were the legitimate substitutes for warlike enterprises; and it was in his successful enforcement of this truth that his greatest service to his country lies. The story of Osborn's life thus furnishes a bright example of devotion to a noble profession, and of zealous and successful efforts to advance its true interests; on the one hand, by improving every branch of the Navy as a power in time of war, on the other by furthering geographical research, and advancing those great geographical and commercial enterprises which Osborn looked upon as the legitimate battles and victories of the Navy in time of peace.

Sherard Osborn was the son of a Colonel in the Madras Army, and was born on the 25th of April, 1822. In September 1837, at the age of fifteen, he entered the Navy as a first-class volunteer on board H.M.S. *Hyacinth*, an 18-gun corvette, commanded by Captain Warren, who gave him the nomination. After visiting Bombay and Trincomalee, the *Hyacinth* arrived at Singapore in May 1838, and was employed to drive the insurgent Malays out of Quedah, a port on the Malacca peninsula, which it was the British policy to restore to the King of Siam. She left Penang in September 1838, in order to blockade Quedah and the River Parlis. For this purpose Captain Warren, besides his own ship, had three lugger-rigged gunboats, manned by Malays; and the command of one of these, called the *Emerald*, was entrusted to young Osborn. Thus, as a midshipman, and when only sixteen, Sherard Osborn took command of his first ship on December 8th, 1838. "All was bright and beautiful to me," he says. "Placed, young as I was, in a position of trust and responsibility, enjoying all the sweets of command and still too young to feel its anxieties, it was indeed the sunny side of the world that I was then enjoying, and as, with a throbbing pulse and zealous heart, I walked my own quarter-deck, how earnest, in all the honesty of youth, were my resolutions to deserve well of my profession." Then followed an exciting time, chasing and capturing piratical *prahus*, service on shore and up rivers, and some hard fighting, until Quedah was evacuated in the following March. At last the time came for giving up his independent command and returning to the *Hyacinth*. "It was not without regret," Osborn tells us, "that I bid my crew good-bye; for my first essay as a captain had been a very very happy one; and if ever a set of poor fellows tried to show that the feeling was mutual, it was exhibited in the warm good-bye of Jadee and his swarthy crew." Osborn kept a careful journal, noting down all he saw, read, or felt, and in 1857 the portion of it relating to the Quedah campaign was published, with a dedication to his beloved old commander, Captain W. Warren, C.B. It is one of the most charming naval stories of this century, full of tales of adventure and of information conveyed in a pleasant and genial form, and has been the delight of many a young officer who has learnt from 'Quedah' the importance of keeping a journal. Osborn always said that to a steady habit of journalising, noting down all he saw, and educating himself with his journal, he was mainly indebted for being able to fight his way up an arduous profession.

After the Quedah service the *Hyacinth* went to China, and Osborn was in her at the reduction of Canton in 1841. In 1842 he joined the *Clio*, commanded by Captain Troubridge, with whom he served on shore at the capture of the batteries of Woosung on the 16th of June. He was afterwards in the *Volage*, and returned home in the *Columbine* in 1843.

On the 6th of December, 1843, he passed his examination for Lieutenant, and was appointed to the *Excellent*, at Portsmouth, where he was a messmate of several of the gallant young officers who afterwards joined Sir John Franklin's Expedition, and whom he had previously known in China. After studying gunnery for a year, he passed out early in 1844 with a first-class certificate as gunnery officer, and was specially selected as Gunnery Mate of H.M.S. *Collingwood*, an 80-gun line-of-battle ship, which was commissioned as Flag-ship in the Pacific on May 4th, 1844.

The *Collingwood* bore the flag of Admiral Sir George Seymour, and was, in her day, the smartest as well as the happiest ship in the service. Her Captain was the late Admiral Sir Robert Smart, her Commander was the present Admiral H. Broadhead; and it is a remarkable fact that no less than five naval squadrons are at this moment commanded by old *Collingwoods*, namely, the Channel, the East Indian, the Pacific, the Australian, and the Flying Squadrons. Sherard Osborn brought the gunnery-drill of the *Collingwood*, both as regards general quarters and small-arm practice on shore, to a very high degree of efficiency, serving as Mate until his promotion on May 4th, 1846, and afterwards as Gunnery Lieutenant until the ship was paid off on July 20th, 1848. In the *Collingwood* Osborn visited most of the ports on the west coasts of South America, Mexico, and California, and the Society and Sandwich Islands; and he was especially fascinated by the grandeur of the river systems of South America, as future fluvial highways of commerce. He collected and wrote much on this subject; and it is very interesting, as instancing the completeness of all his life-work, that in after years, as one of the Directors of the Amazon Steam Navigation Company, he should have been able to realise one of the dreams of his youth.

After the *Collingwood* was paid off, Osborn was appointed to command the small screw-steamer *Dwarf*, for service on the coast of Ireland during the Smith O'Brien riots, and received great praise for his gallantry and seamanship in saving her when in a sinking state, after a heavy gale of wind. But on the return of Sir James Ross in the autumn of 1849, the fate of Sir John Franklin's Expedition, in which were many of his own friends and messmates, absorbed all his attention, and aroused his enthusiasm to the utmost. For it was proposed, and in very influential quarters, that the search for the *Erebus* and *Terror* should be abandoned, it being suggested that these ships had never entered Lancaster Sound, but had gone down in Baffin Bay. Osborn hotly opposed this advice with all the energy of his character, repelling the arguments of those who wished to abandon Franklin to his fate with scornful indignation. He aroused the country, and before the close of 1849 the Government had resolved to renew the search.

The Arctic Expedition of 1850–51, under Captain H. T. Austin, C.B., consisted of two sailing-vessels, the *Resolute* and *Assistance*, and two steam-tenders; and Osborn received the command of the steamer *Pioneer*, as tender to Captain Austin's ship, the *Resolute*. This Expedition, taken as a whole, and considering its various results, was the most successful and important that ever entered the Arctic regions. Captain Austin's arrangements for winter-quarters, and the system he introduced, secured not only the health but the cheerfulness and happiness of officers and men. There was no sickness, and the only death was due to an accident. M'Clintock, who had the experience of Sir James Ross's Expedition to aid him, developed the system of sledge-travelling under Austin, and brought it to great perfection, so that many hundreds of miles were explored. Osborn showed the importance of steam-power in the ice, and his exploits in Melville Bay led directly to the adoption of powerful screw-steamers for the whaling fleet. This was his special part of the work; but he was one of the leading spirits of the expedition, and accompanied Captain Ommanney in the journey across the frozen sea to Cape Walker, and onwards, in independent command, to the western extreme of Prince of Wales Land. Fifteen sledges, manned by 105 officers and men, were equipped for the search, and nobly did they all do their work. But Osborn gives the chief credit to the men. "On them fell the hard labour, to us fell the honours of the enterprise; yet none excelled the men in cheerfulness and sanguine hopefulness." Of the officers, "M'Clintock," says Osborn, "had fairly won the palm; in eighty days he had travelled 800 miles, and heartily did all congratulate him on his success."

On the return of Captain Austin's Expedition in the autumn of 1851, Osborn again pleaded earnestly for a renewal of the search. Until the fate of Franklin and his people was discovered, and the records brought home, and not till then, Osborn again and again declared, would England have done her duty towards the captains, officers, and crews of H.M.S. *Erebus* and *Terror*. The publication of his 'Stray Leaves from an Arctic Journal,' in February 1852, which contains an admirable account of ice-navigation in Melville Bay, of Arctic winter-quarters, and of Arctic sledge-travelling, stimulated public interest, and early in 1852 the dispatch of another expedition was decided upon. Osborn again commanded the *Pioneer*, having been promoted to the rank of Commander; and, owing to his previous experience, his presence in the expedition was invaluable. He passed two most trying winters up Wellington Channel, and made long sledge-journeys, one of which, exceeding a thousand miles, on foot. Returning home in the autumn of 1855, he for a few months was Commander of the Norfolk District Coast Guard, an appointment he accepted to recruit his health. He had been for five summers and three winters in the Arctic regions, a service which he ever looked upon as an invaluable training for a naval officer, and from the day of his return he contemplated the renewal of scientific Arctic research at some future day. During the brief interval of rest he undertook the difficult task of editing the journals of Sir Robert M'Clure, and in April 1856 was published, 'The Discovery of a North-West Passage by H.M.S. *Investigator*, Captain R. M'Clure, edited by Captain Sherard Osborn,' which has since passed through four editions.

The Crimean war had broken out before the return of the Arctic Expedition, and Sherard Osborn was soon called from his brief rest to active service. He was appointed to H.M.S. *Vesuvius* in the Black Sea, and assisted Admiral Boxer in restoring order in Balaklava Harbour. He was present at the capture of Kertch, and in the spring of 1855 he succeeded Captain Lyons in command of a light squadron, of fourteen to eighteen gunboats and dispatch vessels in the Sea of Azov; the shores of which were lined with extensive depôts of provisions for the supply of Sebastopol. With extraordinary dash and celerity Osborn attacked position after position, and destroyed the accumulated stores at Berdiansk, Taganrog, Gheisk, and Arabat. During the campaign of 1855 he was promoted to post-rank, and, at the special request of Sir Edmond Lyons, was appointed to the *Medusa*, in which vessel he continued to command the Sea of Azov squadron until the signature of the treaty of peace. In this remarkable service Sherard Osborn displayed great powers of organization, combined with dash and rapidity of action. In recognition of its value he was created a Companion of the Order of the Bath, an officer of the Legion of Honour, and of the Medjidje.

It was at this time, in 1856, that Sherard Osborn became a Fellow of the Royal Geographical Society, just nineteen years ago, and in 1857 he contributed a paper 'On the Geography of the

Sea of Azov, the Putrid Sea, and the adjacent Coasts, with Remarks on their Commercial Future,' which was published in the twenty-seventh volume of our 'Journal.'

In the spring of 1857 Captain Osborn was appointed to H.M.S. *Furious*, on the breaking out of the war with China, and he was entrusted with the responsible duty of escorting fifteen gunboats to China, some of them of the lightest draught that had ever passed the Cape. Sir William Palmer, the Commander-in-Chief at Devonport, was so much struck with the arduous nature of the task that, in giving Captain Osborn his parting orders, he said, in the presence of his Secretary, Mr. Charles Richards, "If you ever, Sir, deliver all that squadron safe to your Admiral in China, you deserve to be made a Commodore." By carrying the squadron on a great circle to the south of the Cape the passage was made without a single disaster; the gunboats arrived safely at Hong-Kong, and their presence changed the character of the war, and brought our negociations to a successful issue. Captain Osborn took a prominent part in all the operations of the war, from the escalade of Canton to the capture of the Taku Forts in 1858, and he was the first to reach the city of Tien-tsin. He afterwards took Lord Elgin to Japan, and led the squadron beyond the surveyed portion of Yedo Bay, until the ships were anchored within gunshot of the capital; which secured the signature of a satisfactory treaty between Great Britain and Japan.

In September 1858 the question arose as to how far it was possible to declare the River Yang-tsze navigable for Europeans, and Captain Osborn undertook to test it by taking the *Furious*, accompanied by the *Cruiser* and two gunboats, up the river as far as she would go. The river was falling, and the navigation was most intricate and difficult. Several times the *Furious* had to be cleared to her keel, in order to float her off unknown reefs and shoals; but he succeeded in reaching Hankow, 600 miles from the sea. The service was a most important one, for it enabled Lord Elgin to insist on the river being opened to foreign commerce; and at this moment there is a line of steamers on it carrying a valuable European trade. The Ambassador spoke of the transport of the *Furious* to Hankow as a feat unparalleled in naval history, and added that the successful issue of the undertaking was due "to the energy, professional skill, courage, and judgment, of Captain Osborn and his able Master," Mr. Stephen Court, another old Arctic officer, who had served with distinction in the *Investigator* under Sir Robert M'Clure.

In 1859 Sherard Osborn returned to England in shattered health, and worked hard to support his family by literary labours. He published his 'Cruise in Japanese Waters,' 'The Fight on the Peiho,' 'On Allied Operations in China,' 'Our Position with China,' 'War and Progress in China,' and 'A Cruise in the Yangtsze,' as articles in 'Blackwood's Magazine' in 1859 and 1860. In the same periodical he also published 'The Voyage of the *Fox* in the Arctic Seas,' in January 1860; 'Iron Clad Ships of War,' in November and December 1860, and March 1861; 'The Transatlantic Telegraph Iceland Route,' in February 1861; and 'The Physical Geography of the Sea,' in March 1861. It was in December 1859, also, that he published his charming memoir of the illustrious Arctic navigator for whose succour he had devoted the best years of his own life. 'The Career, Last Voyage, and Fate of Sir John Franklin,' was one of Sherard Osborn's noblest literary efforts. At this period, also, Osborn contributed two papers to our 'Proceedings,' namely, 'Remarks upon the Amount of Light experienced in High Northern Latitudes during the Absence of the Sun,' and 'Notes Geographical and Commercial made during the Passage of H.M.S. *Furious* in 1858 from Shanghai to the Gulf of Pecheli and back.'

In 1861 Captain Osborn was appointed to H.M.S. *Donegal*, and served on the coast of Mexico until the following year, when the *Donegal* was paid off. In June 1862 a proposal was made to Sherard Osborn by Mr. Lay, as agent to the Chinese Government, that he should take command of a large squadron of armed vessels to be equipped by him in England for the suppression of piracy on the coast of China, on the understanding that he would not be placed under any native authorities, but receive his orders direct from the Emperor. A squadron of six vessels was constructed, equipped, and carried to the neighbourhood of Peking in 1863, with Osborn in supreme command, and Charles Forbes, Burgoyne, Allen Young, and Spencer Chapman under him. But, on reporting himself, Osborn found that the Chinese Government repudiated the engagements of its agent, and wished to place a mandarin as a superior officer over him; and he found also that the altered conditions were likely to cause embarrassment to his own Government. On the one hand, he still had the opportunity of making a large fortune in a perfectly legitimate way; on the other, he saw that his continuance in command might prove compromising to British interests in China. He took a truly patriotic course,—sacrificed private considerations to the interests of his country, and withdrew the whole force. For this unselfish decision he received the warmest official commendation, and the cordial personal thanks of Lord Palmerston. But anyone who knew Osborn could have no doubt of his course of action under such circumstances. Devotion to his profession and love of country were the ruling passions of his life.

At this time Captain Cowper Coles was urging his turret system, which he had first conceived while serving under Sherard Osborn in the Sea of Azov, on the attention of the Admiralty. In developing his ideas Captain Coles had always received cordial encouragement from Osborn; and in 1864 Captain Osborn was appointed to H.M.S. *Royal Sovereign*, an old line-of-battle ship which had been cut down and specially adapted to test the new turret system invented by Cowper Coles. Osborn held this command until the end of 1864, and reported on the perfect success with which 12-ton guns were for the first time used at sea, and generally on the excellence of the turret system.

It was during this period of home service that Osborn at length found time to turn his attention to a renewal of Arctic discovery. He was perfect master of his subject, and had read and carefully weighed all that had been done and written on Arctic matters, both before and since his own return from the far north in 1854. He knew that if the unknown region round the Pole was to be discovered and explored, it must be by that system of sledge travelling which was developed in Captain Austin's Expedition by Sir Leopold M'Clintock. Consequently the route to be selected must be that which, while offering the greatest facilities for retreat, also furnished the means of travelling along a continuous coast-line running northwards. In his memorable paper, read before the Geographical Society on January 23rd, 1865, Sherard Osborn eloquently advocated the dispatch of a naval Arctic Expedition to explore the unknown Polar region by the route of Smith Sound, and consisting of two vessels. Never was there so large and enthusiastic a gathering of Arctic officers and men of science; and it was felt that, in spite of delays and sneers and divided counsels, Osborn's proposal would eventually be adopted. He had on his side complete knowledge, judgment, tact, untiring energy, and perseverance. In his youth Osborn was impetuous, and was occasionally hurried by his zeal into writing or saying things which created opposition. But in his mature years this impetuosity was kept well in hand,

and became a useful servant to aid in the achievement of great ends. The subject was thoroughly ventilated in 1865; articles were written in leading periodicals, and the public became accustomed to its discussion; Osborn was satisfied with this result for the moment, and bided his time.

His great talent for organisation led to his being offered and to his accepting the appointment of Agent to the Great Indian Peninsula Railway, and he sailed for Bombay in March 1865. During the following year he devoted his whole energies to the improvement of arrangements for the traffic, and especially for the transport and shipment of cotton bales, and he effected great and extensive reforms. When, in April 1866, he was obliged to resign his appointment and return to England, owing to ill health, the Government of Bombay expressed "very sincere regret at the prospect of the loss of his services, which have been most valuable to the Government and to the public." In 1867 he became Managing Director of the Telegraph Construction and Maintenance Company, for the purpose of giving his professional knowledge to the work of establishing submarine telegraph communication between Great Britain and her Eastern and Australian possessions. In four years this undertaking was completed by a series of submarine cables from Falmouth, the Mediterranean and Red Sea, to India, China, and Australia. Sherard Osborn, in completing this great work, served the commercial as well as the naval and military interests of his country; and when he read his paper at our Meeting on November 29th, 1870, 'On the Geography of the Bed of the Atlantic, Indian Ocean, and Mediterranean Sea,' he announced that during the two previous years his Company had laid 17,000 miles of cable, worth 6,000,000*l.* He continued to preside over the work of the Telegraph Maintenance Company from 1867 to 1873.

In 1868 Sherard Osborn contested Birkenhead in the Liberal interest, and fought a gallant battle against the overpowering local influence of Messrs. Laird. His failure was an undoubted loss to the House of Commons and to the country. He had a most agreeable voice, great powers of diction, and a ready fluency, which, added to his extensive and varied knowledge, and his aptitude as an administrator and organiser of work, would have ensured to him Parliamentary and official success. In 1871 he had command of H.M.S. *Hercules* in the Channel squadron for some months, and on the 29th of May, 1873, he was promoted to the rank of Rear-Admiral. In 1867 he published two articles in 'Blackwood's Magazine' on

'Our Naval Defences' and on 'The Turret-ships of England and America;' and in 1873 he brought out a thoughtful and most valuable pamphlet on coast defences.

Ever zealous for the advancement of the objects of this Society, and desirous of giving some lasting mark of his sense of the use that our library had often been to him in his researches, he quite recently presented the Council with the sum of 200*l.*, to be laid out in the purchase of valuable works. He did not intend that the name of the giver should become known, but his death removes all necessity for concealment, and it is right that the Fellows should know to whom we are indebted for this munificent gift.

After preparing the way by repeated recurrence to the subject in periodicals, Sherard Osborn read his second paper, 'On the Renewal of Arctic Exploration,' at a meeting of our Society in January 1872. He maintained the same views as he had propounded in 1865, and again urged the value and importance of such expeditions as a school for training naval officers, and as a noble and useful occupation in time of peace. The interval had been well spent, and it was found that all Arctic authorities were now unanimously in favour of Sherard Osborn's route by Smith Sound. It was clear that the public mind was moved, and that it only remained to convince the Government that such was the case. During 1872 an exhaustive Memorandum on the scientific results to be obtained by Arctic exploration was prepared, the greater part of which was written by Osborn; and in December he accompanied our deputation to Mr. Lowe and Mr. Goschen, and took a leading part in the representations that were made. But the result was unsatisfactory.

Sherard Osborn found that the obstacle was the official objection, based on the alleged difficulties and danger of ice-navigation. He therefore became convinced that this objection must be removed, and that the only practical way of getting rid of it was to dispatch a naval officer to the Arctic regions to give a lively and fresh report on ice-navigation and on the modern system of overcoming obstacles to progress in the ice. He selected for this service Commander A. H. Markham, who, under Admiral Osborn's auspices, visited Baffin Bay, Barrow Strait, and the Gulf of Boothia in a whaler, acquired a thorough knowledge of ice-navigation with the aid of steam, and returned in perfect safety. The results of his observations were published in a work, entitled 'A Whaling Cruise to Baffin Bay, in 1873,' to which Sherard Osborn wrote an introduction. Strengthened with this additional evidence, I and the President of the Royal Society, accompanied by Admiral Sherard Osborn, had an interview with the Prime Minister on August 1st, 1874, the result of which is well known. An Arctic Expedition was decided upon, and in December of last year a Committee, consisting of Admirals Richards, M'Clintock, and Sherard Osborn, was appointed by the Admiralty to arrange all the details, and to recommend the instructions that should be given to the leader of the Expedition. Their arduous labours were completed last March; and thus, after ten years, the efforts of Sherard Osborn to secure the dispatch of an Expedition to discover and explore the unknown region round the Pole were at length crowned with success.

The loss of our lamented Associate at such a moment is peculiarly sad. On Monday, the 3rd of May, he went to Portsmouth, and was constantly on board the *Alert* and *Discovery* during the two following days, making the acquaintance of the younger officers, offering useful suggestions, and doing many acts of thoughtful kindness. On the 5th, he returned to London; and he died very suddenly, and without any warning of illness, on the evening of the 6th of May. His remains were interred in the Highgate Cemetery on Monday the 10th, the very day on which we all looked forward to hearing his cheery voice in this room. I and the Secretary of our Society were among the numerous old friends who followed him to his last resting-place. Many comrades in the Arctic regions stood round his grave:—Sir Leopold M'Clintock, Admiral Richards, Captain Allen, Mr. Clements Markham, Dr. Lyall, Dr. Pickthorn, Mr. Allen Young, and Mr. John Barrow, the long-tried friend of all Arctic voyagers. The Expedition which is about to sail was represented by Captain Nares, Captain Stephenson, Commander A. H. Markham, and Lieutenants Giffard, Parr, Rawson, and Egerton. Of old *Collingwoods* there were Admiral Rowley Lambert, and Mr. Clements Markham; and of other old friends and messmates—Sir John Hay, Captains Mayne, Seymour, Davidson, Forbes, Mr. Spencer Chapman, and Colonel Jenkin Jones, were present.

Sherard Osborn had just reached the age of fifty-three. Few men have completed so much work of lasting and permanent value in so short a space of time. His loss will be long and deeply felt in the public service, by the Fellows and Council of this Society, and by a wide circle of friends. It is a sad commencement for the Arctic Expedition. But it should not and will not cast gloom over it. Sherard Osborn has been called away after having done his work bravely and manfully in this world. A truer sailor, a braver officer, a kinder and more warm-hearted friend, never breathed. He leaves behind him a bright example to follow, and that example will strengthen the resolves of the young Arctic officers to deserve the praise which he would have given them with no sparing hand, and to do honour to that noble profession which Sherard Osborn loved so well.

ALEXANDER GEORGE FINDLAY.—A name known wherever the flag of the British Marine has floated, is placed in the list of our losses during the Session just drawing to a close. Mr. Findlay's connection with this Society dates from the year 1844, and during the last nineteen years, with two short intervals, he had been an active and much-esteemed Member of its Council and Committees. He was born in London, January 6th, 1812; his physique during his life, which was never equal to his mental powers, became gradually impaired as the latter ripened, and he died at Dover on the 3rd of the present month, in his 64th year, the event being precipitated by the loss of his wife a few weeks previously.

Mr. Findlay's younger days were occupied in the compilation of Geographical and Hydrographical works, of which his Atlases of Ancient and Comparative Geography are best known to the public. But he did not confine himself to one department of geographical work, his talents soon finding scope in supplying the wants of a class whose literature is to the landsman a sealed book; and by the death of John Purdy, the Hydrographer, in 1843, he was placed in the position of successor to this branch of nautical research and authorship. One of his first works of real importance to the maritime world was the exhaustive 'Directory for the Navigation of the Pacific Ocean,' comprising 1400 pages. This was published in 1851, and for its production he was highly complimented in different quarters, and especially by our former President, Sir Roderick Murchison. Years of intense labour and application were devoted to this work, which stood as the foundation and model for all his later productions.

By the death of Mr. Laurie in 1858, who had previously been the medium of making public Mr. Findlay's works, an opportunity was offered for an enlarged field of enterprise and usefulness, of which he took advantage, resuscitating a business which boasts of being the oldest of its class in Europe but one, and that the respected house of Van Keulen, of Amsterdam, which has existed nearly two *and a half centuries.* Since that date he has been patiently and thoroughly working out the designs which he had formed, and which he lived to accomplish, the greatest of them being his series of 'Six Nautical Directories for the whole World,' comprising 6000 pages. These constitute a monument of industry and perseverance, and are accepted as standard authorities in every quarter of the globe. His books, including the above with the minor but equally valuable 'Sailing Directions,' amount altogether to the enormous total of nearly 10,000 pages, and all are now in constant and daily use.

As a Cartographer Mr. Findlay showed a practical knowledge of the sailor's requirements which the Hydrographic Department of the Admiralty were not able to surpass, and his series of Charts are well known and appreciated by the Mercantile Marine.

Notwithstanding that his own occupations demanded all his energy, he contrived to study numerous branches of science, the results of which, from time to time, were communicated to this and other Societies for the public benefit, and for one of these, on 'The English Lighthouse System,' the Society of Arts awarded him a Medal.

Mr. Findlay was endowed with a wonderfully retentive memory, which stored up information from all sources, and readily yielded itself for use, when called upon, to the most minute detail. The multitude of subjects with which he was conversant was always a matter of surprise to his numerous scientific and other friends. The subject of Ocean Currents was one to which he gave great thought and attention, and he endeavoured, by the digestion of all available information, to reduce to order and usefulness the system of Nature's laws for the advantage of the seaman. On several occasions this Society has received valuable additions to its 'Journal' from his fertile brain and ready pen, one of which, on the Gulf-stream controversy, will be fresh in the minds of many.

In Arctic discoveries he always took a deep interest. At the time of Sir John Franklin's catastrophe he sifted the uncertainty of his route in an able paper contained in the 26th volume of the 'Journal,' and he served as a member of the Arctic Committee of our Society which prepared the arguments that have at length led to our Government undertaking the Expedition now on foot.

Although Mr. Findlay's works are principally Hydrographical, yet he was ever competent to take part in Geographical discussions, and devoted much time to his friend Dr. Livingstone's labours, for whose determined character he had much admiration; indeed the question of the Sources of the Nile was the last subject of his careful investigations, as it was that of his lamented friend. The 29th volume of the Society's 'Journal,' which is occupied entirely by Captain Burton's detailed account of his researches, in company with Captain Speke, in the Lake Regions of Central Equatorial Africa during the years 1857–9, is illustrated by a Map of their routes, constructed by Mr. Findlay from the observations of Captain Speke. This Map has since been extensively used as a foundation for numerous delineations of the successive explorations of Livingstone, Grant, and Baker. The question of the connection of the Lake Tanganyika with the Nile formed the subject of a paper contained in the 27th volume of the 'Journal,' accompanied by a comparative series of Maps relating to the northern end of the lake.

He was elected an Honorary Member of the Societá Geografica Italiana in 1870, under the Presidency of that able Geographer, the Chevalier Cristoforo Negri.

Mr. Findlay's private life is known to few, but those who are acquainted with it held in the greatest respect his noble and unselfish spirit. Leaving no children to continue his good name, he has entrusted this duty to his nephews, who, uniting their efforts, will doubtless endeavour to maintain the reputation of his works, and in so doing perpetuate his memory.

M. D'AVEZAC.—During the past year we have lost our oldest and one of the most distinguished of our Honorary Corresponding Members, M. d'Avezac. The death of this eminent French geographer has been deeply felt by his own countrymen; but his labours during more than half a century have been too valuable to geographers of all nations not to have called forth a feeling of general regret at his loss.

Marie-Amand-Pascal d'Avezac de Castera Macaya was born at Tarbes on the 18th April, 1800, of an old family of excellent position in Bigorre, on which country he published, in 1823, a work in two volumes, entitled 'Essais historiques sur le Bigorre.'

In 1833 he read before the Academy of Sciences in Paris a memoir, entitled 'Examen et rectification des positions déterminées astronomiquement en Afrique par Mungo Park;' and from this period till his death we find him producing a multiplicity of valuable geographical works, from the number of which I can only afford space to quote such as most prominently indicate the *extent and variety of his* attainments, and of his application of them.

In his 'Esquisse générale de l'Afrique, et l'Afrique ancienne,' published in 1844, and in his 'Iles d'Afrique,' published in 1848, we find combined in him the historian, the descriptive geographer, the man of science, and the antiquary. Of the interest he took in technical geography, we have evidence in his 'Aperçu historique sur la Boussole et ses Applications à l'Étude des Phénomènes du Magnetisme Terrestre,' published in 1860; and in his 'Coup d'œil historique sur la Projection des Cartes de Géographie,' published in 1863. The predilections of M. d'Avezac, however, mainly leaned to the antiquarian side of geography. In 1852 he published a valuable memoir on the ancient Istriot geographer, 'Ethicus.' In 1845 he had brought out a little work on 'Les Iles fantastiques de l'Océan occidental du moyen age;' and it was about this time (1845–6) that his researches into the history of Atlantic discovery led him to dispute the claims to priority on behalf of the Portuguese, which had been put forth in 1842 by the Viscomte de Santarem. While it is impossible to doubt that each of these learned men was actuated by the most honourable motives, it is, perhaps, equally to be feared that the love of country carried each somewhat beyond the limits of impartial criticism. But not the less have the learned researches of the two supplied us with a variety of facts of much value in the history of geography. In later days M. d'Avezac has occupied himself with 'Considérations géographiques sur le Brésil, à propos de l'histoire de cet empire par M. de Varnhagen,' and with dissertations on the date of the birth of Columbus, and the authenticity of the narrative of the life of the great discoverer by his son Ferdinand.

M. d'Avezac was admitted into the Société de Géographie in Paris in 1831, and from 1833 to 1835 occupied the post of "Sécrétaire Général" to the Society. Thirteen times he was elected Vice-President, and six different times he had the honour of occupying the chair of President of the Society. In 1873 he received, as an entirely exceptional honour, the title of honorary President of the Central Commission of the Society. M. d'Avezac was a member of the Institute of France, and one of the founders of the Ethnological Society of Paris. He was elected an Honorary Corresponding Member of our Society in 1836, and took pleasure, when his health permitted, in visiting the meetings of the Geographical Section of the British Association. He was also an honorary member of the Asiatic Society, and of many other literary societies in Europe, Asia, and America, and was decorated with many foreign orders.

These are some of the facts by which M. d'Avezac was known to the world at large. Those who had the honour and privilege of knowing him personally, can never forget that unvarying kindliness of manner which was the natural expression of his frank and generous character. His zeal in controversy never betrayed him into the slightest deviation from courtesy, and he begrudged no amount of labour that might give proof of the loyalty of his friendship. He was sincerely beloved and honoured by the *élite* of the French literary world, and when, after six months of exhausting suffering, passed unremittingly in the prison of his arm-chair, his worn-out body was carried to the grave, that love and that respect were testified by the presence of all the members of the Institute of France, and by such of the members of the Société de Géographie as were at the time present in Paris. An allocution was then pronounced in his honour by M. Alfred Maury on the part of the Institute, and another by M. Deloche on the part of the Société de Géographie. M. d'Avezac's death took place on the 14th of January last.

HENRY GRINNELL.—The name of Henry Grinnell, of New York, will ever be held in the highest esteem by English geographers for the prominent part he took in promoting the search of the lost Sir John Franklin, and for having equipped at his own cost the vessel which sailed with that object under the command of De Haven in 1850. He was born at New Bedford, in Massachusetts, but he removed at an early age to New York, where, in course of time, he became a shipowner and merchant, and arrived at great wealth and reputation. He was the founder and first President of the American Geographical Society, and was elected in 1862 one of the Honorary Corresponding Members of our own body. Part of the expense of the celebrated expedition of Dr. Kane, and the later voyages of Hayes and Hall, was defrayed by this enlightened and munificent patron of geographical enterprise. He died at New York on the 30th of June, 1874, at the age of seventy-five.

SIR CHARLES LYELL, Bart.—Although known to the world almost exclusively as a geologist, this distinguished writer and worker may be claimed also as a geographer, on account not only of the numerous journeys he undertook to distant countries for scientific investigation, but because Geology, in his hands, especially in his greatest work, 'The Principles,' embraced, to a great extent, the same class of phenomena as Physical Geography. It is claimed for him, with justice, that he was the first to seek, with complete insight and definiteness of aim, in physical agencies now in operation, the causes of those great changes which the earth and its inhabitants have undergone in past times; and such inquiries necessarily included an explanation of the latest changes which brought about the present configuration of the earth's surface. In fact, to the Physical Geographer, 'The Principles of Geology,' particularly the 10th and 11th editions, and his 'Antiquity of Man,' are rich storehouses of facts and reasonings in this department of science, which he would search for in vain elsewhere. This great philosophical geologist, from the first, took an interest in the aims of our Society, having joined it in the year of its foundation, and paid frequent visits to its collections for the purposes of inquiry and reference up to within a few months of his death.

He was born at Kinnordy, in Forfarshire, the residence of his father, a landed proprietor of the county, on the 14th of November, 1797. His early education was received at a private school at Midhurst, and in due time he entered at Exeter College, Oxford, where in 1819 he took his Bachelor's degree and obtained a second class in Classical Honours in the Easter Term. He was first led to the study of Geology by attending Dr. Buckland's lectures on that science after leaving the University, and henceforward he devoted all his time and energies to the fascinating pursuit. The first portion of his 'Principles of Geology' appeared in 1830; but before that date he had contributed numerous papers to the Geological Society, which gave indications of those powers of accurate observation and philosophical generalisation which subsequently procured for him the reputation of the greatest geologist of the day.

It is not our purpose, nor is this the place, to pass in review the numerous subsequent works he published on geological subjects. A few details may, however, be given regarding the many journeys he undertook for the purpose of geological investigation of distant localities. In the earlier part of his career he visited, with this object, Norway, Sweden, the Danish Islands, Switzerland, Southern Italy, and Spain; and the successive editions of 'The Principles' were enriched by the observations made during these tours. In 1841 he undertook a longer journey to the United States of America, remaining for a year, and travelling over the Northern and Middle States as far southward as Carolina. The general results of this important journey was given to the world in his narrative, in two volumes, entitled, 'Travels in North America, with Geological Observations on the United States, Canada, and Nova Scotia,' published in 1845. Besides its special interest in relation to Geology, this work proved attractive as containing the observations of a thoughtful mind on the social, œconomic, and general aspects of the country, and justifies us in placing our deceased colleague in the foremost rank of travellers. In 1845 he paid another visit to North America, devoting himself more especially to the Southern States and the shores of the Gulf of Mexico. An account of this journey was given in his 'Second Visit to the United States of North America,' published in 1849.

Sir Charles Lyell received the honour of Knighthood in 1848, and was raised to a Baronetcy in 1864, on the recommendation of Lord Palmerston, the then Prime Minister. The title becomes extinct by his decease.

The Rev. CHARLES NEW.—This distinguished African traveller and Honorary Corresponding Member of our Society, whose recent loss near Mombasa we have to deplore, was born at Fulham in January, 1840. His parents were of humble station in life, but, like those of Dr. Livingstone, endowed with sterling moral qualities, which influenced the character and career of their children. From his father he inherited a spirit of indomitable courage and perseverance, and to his mother he owed the training which gave a pious direction to his mind. The only education he received was obtained at the St. John's National School, supplemented by attendance at the Sunday Schools of the United Methodist Free Church Chapel at Walham Green, during the time when his week-days were occupied in earning the means wherewith to assist his parents. When a little older he learnt the mechanical trade of boot-making, at which he worked until he resolved to choose the profession of minister in the church of his adoption.

About this time he became acquainted with the Rev. John Steele, who took deep interest in him, gave him a home, furnished him with books for study, and encouraged him in the use of his talent as an occasional preacher. His deep piety and consistent character led that gentleman, when on a visit to London, to recommend him to the notice of the Rev. R. Eckett, ex-President of the United Methodist Free Churches. He followed the profession of minister for about three years, and the esteem he gained was shown by his being sent to Bristol as a representative at the Annual Assembly in July, 1862—a turning-point in his life, as it was there that he was requested to accept the post of missionary in East Africa as the colleague of the Rev. Thomas Wakefield. He left England on the 12th December of the same year; on his way out making the acquaintance of Colonel Playfair, who had been appointed to the Consulate of Zanzibar, and was proceeding thither by the same route.

Reaching Bombay on the 11th January, 1863, he was kindly entertained by Dr. Wilson, of the Scottish Free Church, and by the Rev. D. Williamson, of the United Presbyterian Society, whose generosity made a deep impression on his mind during his two months' stay. Having a recommendation from Sir Charles Wood, then Indian Secretary, the document was presented; and Sir Bartle Frere, with his usual courtesy, granted him a passage on board the *Pleiad* to Zanzibar, where he arrived on the 7th of April, and in another fortnight at Mombasa.

After grappling with fever and acquiring the language, he commenced work among the Wanika in September, 1863. During the nine years he was thus engaged his love of travel led him to make various important journeys in the interior. In 1866 he penetrated among the Gallas, calling at Lamu and Patte, returning by the Ozi, and traversing a portion of the Galla land to Malinde; whence he returned overland by Takaunga to Mombasa. In October of the same year, in company with Mr. Wakefield, he left Mombasa again on another visit to the Gallas, visiting many new districts, the journey occupying about four months.

In July, 1871, he started on his remarkable expedition to Kilima-Njaro, taking Lake Jipe by the way. As already recorded in our 'Proceedings,' he was the first traveller who had succeeded in actually reaching the snows of this wonderful mountain. On Monday, the 14th August, he made his first ascent of Kilima-Njaro, and on the 26th succeeded in his object of reaching the snowy cap. On his return he visited the previously unknown Lake Chala, and arrived at Ribé, the Mission Village near Mombasa, on the 10th of October. Not the least important of his services to science on this hazardous but successful journey was the making a collection of the plants growing near the snow-line on Kilima-Njaro, which was found to possess peculiar interest.

After this last undertaking Mr. New obtained leave of absence for the purpose of visiting his native country, and on the 15th March, 1872, arrived at Zanzibar. Here his journey to England was interrupted by his being invited by our Council to join the

Livingstone Search Expedition, under Lieutenant Dawson; but Mr. Stanley arriving in the mean time from his successful succour of the great traveller, the Expedition was broken up, and he came home. While in England during this temporary visit, he was actively employed in the work of the Missionary Society to which he belonged, attending the meetings, besides lecturing in most of the principal towns of the kingdom for the British and Foreign Anti-Slavery Society. He found time, however, to write an account of his ten years' labours and travels, which he published under the title of 'Life, Wanderings, and Labours in Eastern Africa.' Previous to his departure for Africa the second time, he was received, on the recommendation of Sir Bartle Frere, as a Corresponding Member of the Royal Geographical Society, an honour which seemed to inspire him with a stronger desire to do the work on which his heart was set.

He left England again on the 7th of May, 1874, arriving in Zanzibar after a quick passage of twenty-six days. In less than a fortnight he had organised a party for a trip to Usambara; and in less than two months after his departure from England he was again in the heart of the African jungle, visiting Vuga, the capital of Usambara, and travelling thence across the picturesque and little known country which lies betwen Vuga and Mombasa. An account of this journey was transmitted by him to us, and read at our Meeting of the 12th April last. After a short period of rest at the Mission Village of Ribé, on November 30th, 1874, he wrote to his family: "I am ready to start for Chagga, my men cross for the mainland to-day; I shall be away for three months or longer, but you shall hear from me as soon as possible." The promised communication was never made, for he died on his return journey. It appears from a statement made by the Rev. Mr. Williams, of the Church Missionary Society, that he made his way to Chagga, but found the Chief very exacting, so that, after staying some time, he started back for the coast. On Saturday, February 13th, 1875, he sent a letter to his colleague, stating he was very ill, and begging some assistance. This was promptly attended to, but the succour arrived too late; he had expired when the messengers returned. Mr. Wakefield was soon by his corpse, which was carried to Ribé, and buried by the side of former colleagues, equally victims of this treacherous climate.

AUGUSTUS RAYMOND MARGARY, who was barbarously and treacherously murdered at Manwyne on the south-west frontier of China, on the 21st or 22nd of February last, was the third son of Major-General Margary, R.E., and was born at Belgaum, Bombay, on the 26th May, 1846.

As a child he was remarkable for his sweetness of disposition, courage, and intelligence. His natural perseverance and aptitude were such that, although he had no instructor but his mother in the tropical climate in which his first years were spent, when sent home to school in France, at the age of nine years, he took his place with ease amongst English boys of his own age. After a time spent under the care of the Rector of Swafield in Norfolk, and at the North Walsham Grammar School, he was for seven or eight years at Brighton College; and having further pursued his studies for two years at the London University he obtained a nomination to compete for a student interpretership in China. He succeeded in passing a successful examination, and was sent out in that capacity on the 20th March, 1867. His strict attention to duty and study at Pekin again secured his success, and he obtained the reward for rapid proficiency in the Chinese language.

In 1870 he was sent as interpreter to Tam-suy in Formosa, and made during his residence several excursions into the northern part of the island. When at Ke-lung he had, with his friend Mr. John Dodd, a British merchant there, the happiness of rescuing about forty-two lives from shipwreck at the risk of his own, during the raging of a violent typhoon on the 9th August, 1817, for which deed of bravery they both received the Royal Humane Society's medal, and were honoured by the Queen with the decoration of the Albert Medal of the First Class. In 1872 he visited his native land for sixteen months, and took part in a discussion on Formosa at one of our evening meetings during that time. Returning to Shanghai, *viâ* the trans-continental railway through North America, and touching at Japan, he received instructions in August 1874 from H.B.M.'s minister at Pekin, to proceed at once through the vast south-western provinces of China to await at one of the passes on the frontier of Yun-nan the arrival of Colonel Browne's exploring party from Calcutta, which was to proceed *viâ* Burmah and up the Irrawaddy.

In a letter dated August 16th, 1874, he wrote: "My mission is a very arduous one for me to undertake single handed;" but he called it a splendid mission, and said, "I have only to pray for health and strength to carry me through, and there is no doubt I shall have had the privilege of doing some service to the world at large." Afterwards, in a series of long and most interesting letters, he gave an account of the whole journey, with a touching description of the manner in which he had to steal away from Shanghai under cover of the darkness, without bidding any of his friends adieu, secrecy having been strictly enjoined by the authorities lest any obstacle might be placed in his way by the Chinese local mandarins. He voyaged up the Yangtsze in the steam-ship *Hirado*, "stepping across a pontoon on to one of those American river-palaces, which plough up and down the huge rivers." He describes his great interest in gazing on the wonderful old city of Nankin—the theatre of so many atrocities during the Taeping rebellion; its grim, dirty walls, built into the sides of hills which skirted one face of the city. For some miles nothing could be seen but these grim battlements. At Chung-Ching he expected his difficulties would commence, having thence to enter a portion of China, where a foreigner had never been seen. Leaving the great steamer at Han-kow, he took a "house-boat," and his route followed the bend of the great Yang-tsze-kiang to the entrance of the Tung-Ting Lake, which he crossed. The boat then entered a river (the Yuen), which flows in at the south-western extremity of the lake, and after passing Chang-teh, continued up the stream to the borders of the province of Kwei-chow. There his navigation came to an end, and the land journey commenced in chairs over the magnificent passes that abound in that mountainous province, the beauty and grandeur of which he could not find words to describe. He was seized with very serious illness while in the "house-boat." Fever, pleurisy, and at last dysentery attacked him, reducing him to a skeleton; but he recovered, and gained strength when the effects of a voracious appetite began to tell. At Chin-yuen, where the boat journey ended, he with difficulty escaped the violence of the mob. He slept in the town, but was off by daylight, and they actually destroyed the boat which he had hired at Han-kow.

At Kwei-Chow he visited the Governor, and called privately on the French Bishop, who conversed in Chinese, and seemed to have forgotten his own tongue! He found him living in a yamen, and insisting on styling himself a "Ta-Jën" (great man). During this part of his journey Mr. Margary was greatly annoyed by the curious prying eyes of the natives.

At the city of Yun-nan and beyond, at each place where he stopped his wants were attended to, and food comfortably provided. Two military officers were sent to accompany him to Ta-li Fu. According to his letters home, these officials showed him all sorts of kindness and honour. From Yun-nan he went to Chow-Chow, 10 miles from Ta-li, which place he made his headquarters, returning there to his servants and baggage, after having paid his visit to the wonderful old city, in spite of most earnest entreaties and warnings against the danger of doing so. His successful interview with the Tartar General, the Taotai, the Prefect, and the Magistrate, gratified him much. "All these meetings," he wrote "effect an infinity of good, in establishing an amicable footing between us and the Chinese; and I am proud to think that I have drawn a successful trail across a large extent of country. I am not boasting, and really don't care twopence about myself in the matter; but the good sound impressions I have laboured to produce make me zealous for my country's advantage, and fill me with elation."

On the 5th January he reached Tèng-yueh-Chow, or Momein. "This," he wrote, "is the very end of China, and the goal I sought. But I am going further." He received a despatch from the Political Agent at Bhamo, saying that the Expedition had not yet started, and he was to join it at Bhamo soon after January 1st. A journey of seven stages had to be performed before reaching the well-armed English party. A Burmese guard of forty men was sent to conduct him through the wild Kakhyen hills, and he reached Bhamo on the 15th January, where he had the great pleasure of meeting again with fellow-countrymen, after his wonderful journey of 2000 miles across a region which no Englishman had previously succeeded in traversing.

He had but few days to rest, for on the 23rd Colonel Browne decided to start the Expedition. The intention of the leader had been to go by the lower mountain-passes from Sawuddy; but meeting with various hindrances and preposterous demands on the part of the natives, this route had to be abandoned, and unhappily for the brave subject of this sketch, the upper, dangerous, and difficult track was determined on. A fresh start was made *viâ* Tsikaw and Serai, to the town of Manwyne, where Mr. Margary went forward to reconnoitre, and fell in the execution of his duty.

In the death of this enthusiastic young traveller the Society has lost a Member whose future career was full of promise, and his *family* mourn one of whom an affectionate parent writes: "None an replace him in the circle where only he was truly known; so rue, so faithful, so unselfish was he."

Vice-Admiral Sir Henry Kellett, k.c.b.—After passing the irst three years of probation in the Navy in the West Indies, young Kellett joined the *Eden*, under the command of that able nd scientific officer, Captain W. F. Owen, and by him was initiated nto, and learned to like, that surveying service which he stuck to hroughout the greater part of his career with so much benefit, not nly to his own country, but to the world at large. Few officers of H.M. Navy have gone through such a career of public utility. Out of 41 years of active service, two-thirds were spent in advancing our knowledge of the globe. The coast of Africa, the Mediteranean, the coast of Portugal, all bear testimony to the result of his early labours; but it is in the Pacific Ocean, and upon the coast of China, that he has especially left a record which will establish his name as one of the ablest and best contributors to the correct delineation of the shores of those countries. On the coast of China, after taking so important a part in the first war there that he received in the course of two years his promotion from ieutenant to captain and the honour of the Companionship of the Bath, he remained in the country until a sufficient survey of that hitherto unknown coast was produced to enable the merchants to avail themselves of the Treaty Ports which had been opened. On the west coast of America no one else ever had so complete a knowledge as he had of it from lat. 72° n. to 33° s. In the voyages of the *Sulphur* and the *Herald* the delineation of the coast was laid down with great accuracy from the River Guayaquil to Vancouver Island; and he may be said to have taken a personal part in the survey of every harbour of importance from lat. 8° s. to 60° n. Called upon to take part in the search for Sir John Franklin, he saw Lieutenant Pullen safely on his way round Point Barrow in his boat expedition to the Mackenzie, and subsequently discovered that land to the north of Siberia which had hitherto only been known by report from the natives. The following year, having previously, by his survey of the Amoukta Channel, provided Captain McClure with the means of safely passing through the Aleutian chain of islands, and thus making the rapid passage which enabled him to round Point Barrow that season, he accompanied him up to the edge of the ice; little imagining where they would next meet. That meeting, as is well known, took place two years and nine months afterwards on board the *Resolute*, at Dealy Island.

Returning to England in the *Herald* in 1851, he was appointed to the command of the *Resolute* in 1852; and, in the two years following, the north face of the Parry group was completely explored by expeditions from that ship and the *Intrepid;* the crew of the *Investigator* were rescued from their perilous position in Mercy Bay, and tidings of the safety of the *Enterprise* obtained. Being caught in the pack in attempting to return to the eastward in 1852, he was ordered to abandon the ship in the spring of 1853, and returned to England in the *Phœnix*. A court-martial was held upon the officers and crew at Chatham for the loss of the ship, when the president observed that he experienced much pleasure in returning Captain Kellett his sword, which he had worn with so much satisfaction and advantage to his country. In 1854 he was appointed Commodore in the West Indies; a position which he worthily occupied for the long period of five years, indicating the confidence of Government in the many important questions he had to settle; and, upon his vacating the command, receiving from the merchants of Jamaica a handsome service of plate, in recognition of their estimation of his character. From 1864 to 1867, as Admiral-Superintendent of Malta Dockyard, he had an opportunity for the exercise of that geniality and energy which distinguished him, in the troublesome business of the extension of the dockyard which was then in progress.

The final service of his long, active career was as Commander-in-Chief on that Chinese station on which 30 years before he had left an enduring mark. Returning in 1872 to England, much enfeebled by long and arduous service in every climate, he retired to his country seat at Clanocody, near Clonmel, with the hope that rest and quiet might restore him to health. In this hope, however, his friends and relatives were disappointed, and on the evening of March 1st he passed quietly away to his rest.

In Henry Kellett we have an admirable example of the scientific officer of our Naval service: a man who combined skill, indomitable energy and seamanship, with frank boldness. It is by such men, working for years laboriously and unostentatiously, and, it is to be feared, but little appreciated beyond the walls of this Society, that the great additions have been made to our nautical knowledge of the world, by which geographical science has been advanced, and ocean navigation made more secure. And it is by the proper use of such men on our Naval and Military expeditions that advantages are reaped, in some respects more lasting and beneficial than many of those obtained by the direct force of arms.

CHARLES F. TYRWHITT DRAKE.—This accomplished Eastern traveller was the youngest son of Lieut.-Colonel William Tyrwhitt Drake, R.H.G., and was born at Amersham, on the 2nd January, 1846. He began his education at Rugby, and was, after a short time, removed to Wellington College, where, to use Dr. Benson's (the head master's) words, "He was our chief naturalist; he found out the great variety of birds which inhabited the fir woods and the heaths, the Finchampstead Ridges, and the rich Blackwater Valley. He knew, I believe, the flight and note of every species. He was also a good botanist." When he left Wellington College he proceeded to Trinity College, Cambridge, but, owing to ill-health (chronic asthma), he was obliged to go abroad for the winters, and so never took a degree. He spent the winters of 1866 and 1867 in Morocco, making expeditions from Tangier to Mogador, and even as far as the city of Morocco. During these excursions he acquired that knowledge of Eastern language and character which was afterwards turned to such good account in his subsequent explorations of Palestine and Syria. The winter of 1868 he spent in Egypt, improving his knowledge of Arabic; and in the spring of the following year he made an expedition to Sinai, where he made the acquaintance of the officers of the Sinai Survey Expedition, who had just completed their labours, and were on the point of leaving. In the autumn of the same year he returned to the East in company with Mr. (now Professor) E. H. Palmer, and, starting for Suez on foot, the two travellers thoroughly explored, for the first time, the Bádiet el Tîh, or the Wilderness of the Wanderings; the Heyeb, or *south country* of Scripture; the mountains of the Azazemeh, and parts of Edom and Moab. It may here be mentioned that the map made by the two travellers, though they were previously totally unused to surveying, was only 1½ mile in error in the whole distance from Nakel to Hebron, a total distance of over 600 miles; and less than a mile wrong in Moab. The accounts of these journeys, and the maps made by Drake and Palmer, will be found in the 'Desert of the Exodus,' and the 'Palestine Exploration Fund's Quarterly Journal.'

In 1870 Mr. Drake again started for the East, his object being to obtain copies of the celebrated inscribed stones at Hamath, which have since been removed to the museum at Constantinople.

On his return from this expedition he joined Captain Burton, then Consul at Damascus, on a most adventurous expedition to the volcanic regions east of Damascus, and to the "Aláh," or highlands of Syria. The results of these journeys have been published by him and Captain Burton jointly in two volumes, entitled 'Unexplored Syria,' in which the maps and sketches were entirely his work. A paper relating to a portion of the same journeys was published in vol. xlii. of the 'Journal' of our Society, as the joint production of Captain Burton and Mr. C. Tyrwhitt Drake.

From that time to his death he was employed by the Palestine Exploration Fund on the Survey of Palestine, and his papers in their Quarterly Journals bear record to the earnestness and linguistic skill and knowledge which he brought to the task.

While encamped at Ain Sultan, in the Jordan Valley, he had a bad attack of fever, at Christmas, 1873; and this had so weakened him that, when again struck down in May, he was unable to rally, and expired on 23rd June, 1874. He was buried the same day in the English Cemetery at Jerusalem.

At the time of his death, he had gone to Jerusalem to make his final preparations for a holiday excursion into the mountains of Syria; and he had long looked forward to another expedition to Morocco for the purpose of exploring the Atlas chain when his work in Palestine should be finished.

Mr. Drake was elected one of our Fellows in January, 1872.

Dr. C. T. Beke, the well-known traveller and geographical critic, died on the 31st of July last, in the 74th year of his age. He was descended, as we are informed, from a good old Kentish family, which had given its name to, or taken it from, Bekesbourne, near Canterbury, at which place our deceased Associate resided during many of the later years of his life. Originally engaged in commercial pursuits in England, and for a time also in Italy, he subsequently studied law, and in 1837–8 he was Acting-Consul for England in Saxony. Shortly previous to this he made his appearance as an author by the publication of his 'Origines Biblicæ, or Researches in Primeval History,' a treatise which brought him into prominent notice, through the controversies which his views on some points of his subject gave rise to. In 1835 he published a paper 'On the Geological Evidence of the Advance of the Land at the Head of the Persian Gulf,' which was followed in 1836 by another, 'On the former Extent of the Persian Gulf, and on the

Non-identity of Babylon and Babel.' The bent of his mind at this time, and it may be said throughout his life, was towards Historical Geography and Ethnology, particularly in reference to the countries of North-Eastern Africa and South-Western Asia, which have always excited so large an amount of popular interest; and whenever the public mind was excited by some discovery or remarkable event in these regions, the pen of our talented Associate was called into activity. In 1836 appeared his treatise 'On the Complexion of the Ancient Egyptians,' and in 1838 his 'Passage of the Red Sea by the Israelites, and its locality; and on the situation of Mount Sinai.' This last-mentioned was a subject which he re-agitated towards the close of his life, when he undertook in the winter of 1873–4, being then seventy-three years old, a journey to the head of the Gulf of Akaba, in order to establish the proof of his conjecture that the true Mount Sinai was situated to the east of the gulf, instead of to the west in the peninsula to which it has given its name.

In 1840 he undertook a journey to Abyssinia for the purpose of opening up commercial relations between that country and the adjoining dependencies of Egypt. During this expedition he rendered considerable service to geographical science by the numerous observations for the latitude and altitude of the places he visited, and especially by his exploration of the southern borders and tributaries of Lake Tsana. He entered Abyssinia from the south, having landed at Tajurrah on the 15th of November in the above-mentioned year, and proceeded by way of Shoa to Gojam, where he remained until February 1843, when he returned by Lasta and Tigré to Massowa. A narrative of his proceedings was contributed to our Society, and published in the 12th, 13th, and 14th volumes of our 'Journal.' For this important service he received the Founder's Gold Medal for the promotion of Geographical Science and Discovery in 1845. The information obtained on a variety of special subjects during this journey was given to the public in a series of memoirs, published from time to time in subsequent years. Such were his 'Origin of the Gallas,' 1848; 'On the Geographical Distribution of the Languages of Abyssinia and the neighbouring Countries,' 1849; 'On the Korarima or Cardamom of Abyssinia,' 1847; 'Remarks on the Mats'hafa Tomar, or the Book of the Letter, an Ethiopic MS. in the University of Tübingen,' 1848; and many others. He afterwards edited the work of Gerrit de Vere on Dutch Voyages to Spitzbergen and Nova Zembla in 1594–6, which was republished by the Hakluyt Society in 1853.

Dr. Beke's attention was next turned towards the subject of the sources of the Nile, and to him, I believe, belongs the honour of having first suggested the east coast of Africa at Zanzibar as a suitable starting-point for an expedition to solve the great geographical problem. When he attempted in 1848 to give practical effect to his views, he was not successful; but he had the satisfaction, ten years later, of seeing them carried out by Captains Burton and Speke, and of pointing to the great discoveries achieved by this and other subsequent expeditions as proving the truth of his surmises. Henceforward he came frequently before the public as a writer and lecturer on the subject of the Nile, and his lucubrations were always remarkable for the boldness of the hypotheses he hazarded on points of geographical fact, as well as for the extensive knowledge he displayed of the literature of the subject.

During the period immediately preceding the Abyssinian war, Dr. Beke took a prominent part in the discussion which arose with regard to the best mode of obtaining the release of the English captives, and even made a journey himself to Massowa on behalf of the friends of the missionaries who were incarcerated with the British Consul and officers, for the purpose of trying his influence on King Theodore. He was not permitted, however, to make the journey to Magdala, and returned to England without having effected their release. The services he rendered to Her Majesty's Government by supplying information regarding Abyssinia, on which he was so competent an authority, were substantially rewarded on the completion of the campaign.

The last undertaking in which Dr. Beke was engaged was that to which I have already alluded, namely, the attempt to verify, by personal examination, his conjecture regarding the true Mount Sinai. He left England in December 1873, accompanied by Mr. John Milne, as Geologist and Surveyor, and was conveyed, by the liberality of the Khedive of Egypt, in one of the Government steamers to Akaba, whence he proceeded to the Harra Radjlâ, in Arabia Petræa; and after taking observations for the altitude of the mountain, and examining the surrounding country, returned to Europe, claiming that all the necessary conditions of the Mount Sinai of Scripture were fulfilled by Jebel en-Nar. He was detained for some weeks on his way home by a severe attack of illness, and died, not long after his return, as already stated, on the 31st of July last.

WILLIAM WINWOOD READE, the well-known African traveller and writer, was the eldest son of William Barrington Reade, of Ipsden, Oxfordshire, and of Elizabeth, the Lady of Ardbenny, N.B., the only child of Captain J. Murray, R.N., many years employed in command of H.M.S. *Sorlings*, surveying in Australia. He was born at Murrayfield, near Crieff, N.B., on the 26th December, 1838. Primarily he was under the tutorage of the Rev. Dr. Godby, Head-master of the Royal Grammar School at Henley-upon-Thames; afterwards under that of Dr. Behr, at Winchester, from whom he was transferred to Magdalen Hall, in the University of Oxford.

He very early in life displayed a taste for literature and scientific studies. Fired by perusing M. Du Chaillu's adventures in the Gaboon region of Western Africa, he started off to the same country, ambitious to secure live gorillas. He hunted those animals with great patience, but finding them, so far from being pugnacious, too difficult of access, he expanded his trip into one of research and exploration. On his return, he published his 'Savage Africa.' After some time devoted to science, literature, and the study of medicine, he revisited Africa under the auspices of Mr. A. Swanzy, principally with a view to observe the vegetable productions of various interior districts near the Gold Coast, to visit various tribes, and to endeavour to extend facilities for trade. Here, all alone, he showed his natural courage and perseverance; he penetrated to unvisited regions, and completed his tour by leading an expedition from Sierra Leone to the upper waters of the Niger. The latter important journey was undertaken at the request of the Colonial Government of Sierra Leone. He started in January 1869, and succeeded in reaching Farabana, a town of 10,000 inhabitants, on the upper waters of the Niger. The results of the journey went to show that the Niger flowed within a distance of 250 miles from Sierra Leone, and was navigable from a point only 350 miles distant from the colony. An account of the Expedition was communicated to our Society by the Secretary for the Colonies, and published in our 'Proceedings,' vol. xiv. p. 185. He has given a full account of this his second period of West African travel, lasting two years, in his work entitled 'The African Sketch Book.' In the Ashantee campaign Mr. W. Winwood Reade acted as special correspondent of 'The Times.' Here, as usual, he did not spare himself. Always with the front, personally engaged in the ranks of the 42nd in the great battle of Amoaful, where he was hit three times, though not wounded, he pushed on with that gallant regiment, and was the only civilian who with it marched into and captured Comassie. But this last visit to Africa ruined his health. He returned ill; disease, both in the lungs and heart, declared itself. He gradually wasted away, writing his last book, 'The Outcast,' as it were, in the throes of death; and having been removed, under a forlorn hope, to the house of his friend Dr. Sandwith (of Kars), he died there on the 24th April, and was buried at Ipsden on the 29th, in the 37th year of his age.

As a youth, he published a novelette, 'Charlotte and Myra;' afterwards, an archæological volume, 'The Veil of Isis,' indicating great research; and a novel called 'See-saw.' His subsequent works appeared in the following order:—'Savage Africa,' 'The Martyrdom of Man,' 'The African Sketch Book,' 'Comassie,' and lastly, 'The Outcast.'

Dr. JOHN EDWARD GRAY, F.R.S.—This well-known naturalist, who occupied for many years the important post of Keeper of the Zoological Collections of the British Museum, took a deep interest in Geography, as he did in most other branches of science related to his own special pursuit. He was one of the original members of our Society; and although I am not aware of his ever having contributed to our Transactions, he was occasionally a speaker at our meetings, especially at the time—now nearly 30 years ago—when there was much discussion with regard to the general management of our affairs. In more recent times, he showed his zeal in geographical questions chiefly by his criticisms of the narratives of travellers, in which his love of controversy and impatience of all departure from scrupulous accuracy of statement were very conspicuous. It is not the place here to enter into the question of his merits as a zoologist, or do more than allude to the vast amount of published work he has left as a record of his laborious life. It may be mentioned, however, in justice to his sagacity as a naturalist, that throughout the long period during which the national collections of zoology were under his charge he never lost sight, as was previously, and is still elsewhere too frequently done, of the great scientific importance of affixing locality tickets to every one of the thousands of specimens which were annually added by travellers to the Museum stores; thus laying a solid foundation for the future elaboration of the law of Geographical distribution. He contributed the zoological appendices to the narratives of some of the chief expeditions of discovery; such as the Voyages of the

Erebus and *Terror*, the *Sulphur* and the *Samarang*. After 50 years of service, altogether, in the British Museum, he retired in December last, to enjoy the repose to which he was so well entitled, but which he did not long enjoy. He died on the 7th of March, at the age of 75 years.

FRANK OATES, a young Naturalist traveller of great promise, died on the 5th of February last, in the interior of Southern Africa, whilst on his way back from the Victoria Falls of the Zambesi. He was the eldest surviving son of the late Mr. Edward Oates, of Meanwood Side, near Leeds, and was born on the 6th of April, 1840. After the completion of his education at Christ Church, Oxford, he sought to gratify his strong taste for foreign travel and the practical study of natural history, by a voyage to North and Central America; and on his return from this, his first expedition, in 1872, became a Fellow of our Society. Soon afterwards he planned, with his brother, a journey from Natal into the interior of South Africa, and, in addition to his zoological outfit, provided himself with the necessary instruments for fixing and plotting his route, should he be able to carry out his earnest desire to explore new districts. His journey to the banks of the Zambesi was successfully carried out, and he succeeded in amassing large collections of objects of natural history; but unhappily he delayed his stay until the unhealthy season came on, and contracted a fever, which proved fatal when some days advanced on his homeward march. He died in the Matabele country, at a place about 80 miles north of the Tati river. His family have taken steps to recover his collections and journals which remained in the hands of the Rev. John Mackenzie, of Shoshong, Bamangwato; and as he was known to be an accurate and intelligent observer, it is to be hoped his notes may hereafter be published for the benefit of science.

SIR JOHN RENNIE.—By the lamented death of the eminent civil engineer, Sir John Rennie, we have lost the oldest English representative of that science which during the last century has reflected such distinction on our country, not only in the magnitude of the works constructed, but in the originality of invention which has been brought to bear on them. Sir John, who was born on August 30th, 1794, had, conjointly with his father, the late Mr. John Rennie, built both Southwark and Waterloo bridges, and after his father's death in 1821 completed several important works on which they had been unitedly engaged, viz., London Bridge, Plymouth Breakwater, Sheerness Dockyard, and the completion of Ramsgate Harbour. On the opening of New London Bridge, in 1831, he received the honour of Knighthood. For ten years previously he had held the post of Engineer to the Admiralty, in which he had succeeded his father. It was he who, conjointly with his late brother, Mr. George Rennie, mainly contributed to introduce the screw propeller into the navy, and he was the first to utilise the diving-bell in engineering works. He constructed the machinery for the mints of Calcutta, Bombay, and Mexico, and also erected the Royal Clarence Victualling Yard at Plymouth. In all matters connected with drainage and hydraulic engineering, harbours, canals, and the management of rivers, Sir John was a high authority. He was engaged for a number of years in carrying out the great system of drainage and land-reclamation in the Lincolnshire Fens. Nor were his labours nor his reputation confined to his own country, for he received great distinction from foreign Sovereigns in recognition of his exceptional talent. He constructed the harbour of Ponte Delgada, in the Azores, and received the honour of Knighthood of the Tower and Sword of Portugal. His work on 'The Drainage of Lombardy' attracted so much attention even in Italy, a land so famous for its hydraulic engineering, that the King of Italy conferred on him the order of St. Maurice and St. Lazaro. He was also a Knight of the Wasa of Sweden and Member of the Academy of Science of Stockholm and of the Austrian Society of Civil Engineers. For his beautiful work on Harbours, dedicated to Her Majesty, he received marks of distinction both from the Emperor of Russia and the Emperor of Austria. We have also from his pen a 'Monograph on Plymouth Breakwater,' and a short 'History of Engineering,' in the shape of an address from him, as President to the Institution of Civil Engineers. Sir John was a Fellow of the Royal Society, and of many of the learned and scientific Societies of London. He was also Chairman of the Juries at the Exhibition of 1862. His extensive information, kindly nature, and bright genial expression, both in face and manners, made Sir John a great favourite in society; but of late the infirmity incident to his advanced age necessitated comparative seclusion, and he died, after just completing his 80th year, on the 3rd of September, 1874.

Sir William Fairbairn, Bart., F.R.S., the eminent engineer, who had been Fellow of our Society since 1861, died on the 18th of

August last, at the ripe age of 84. He was born at Kelso, in Roxburghshire, in 1789, and received his early education and his training as a mechanical engineer at Newcastle-on-Tyne. None of the work in which he was engaged throughout his long and active life had any close connection with our own special pursuit, and it need only be mentioned here that he was the author of several important papers on the applications of science, published from time to time in the 'Transactions' of the Royal Society and the British Association; of which latter body he was one of the founders, and President in 1861.

Sir **William Perry**, who died at Venice on the 24th of August last, had been a Fellow of our Society for the past fifteen years. He was the eldest son of the late James Perry, proprietor of the 'Morning Chronicle' newspaper, and brother of our distinguished Associate, Sir T. Erskine Perry. Sir William was born at Merton, in Surrey, in 1801, and was educated at the Charter House School, whence he proceeded to Caius College, Cambridge, where he took his B.A. degree in 1822. He subsequently entered the Diplomatic Service—first as Consul at Panama in 1841, and afterwards as Consul-General for the Austrian Coasts of the Adriatic, having his headquarters at Venice. After his retirement in April 1872, he was knighted by letters patent in June of the same year, but continued to reside at Venice until his death.

Frederick Ketelbey Strong resided for twelve years, from 1833 to 1845, at Athens, where he held the two appointments of Consul-General for Hanover and Consul for Bavaria at the Hellenic Court. During his residence there he published a work, entitled 'Greece as a Kingdom' (London, 1842), being a statistical description of that country, from the arrival of King Otho, in 1833, down to the year of publication. He resigned his posts in 1845, and then removed to Hamburg, where he died on the 18th of April last. He was in frequent correspondence with the distinguished geographer, Dr. Petermann, who named one of the headlands discovered by the late German Arctic Expedition "Kap Strong," in his honour. He was Commander of the (now defunct) Guelphic Order, and Knight of the Bavarian Order of Merit and of the Saviour Cross of Greece.

Besides the above named, we have to record the loss of the following gentlemen, many of whom had distinguished themselves in other spheres outside the domain of geography:—James Allan, E. C. Bowra (a Chinese scholar who accompanied the Chinese Customs Commissioners on their visit to England in 1868), R. Benson, W. E. Blair, Admiral F. A. Campbell, C. R. Cope, B. B. Cabbell, J. Dentry, C. W. Eddy, Rev. J. Graves, Commander J. T. Gowlland, the Bishop of Gibraltar, D. Haysman, A. Lang, W. Blake Lambert, R. S. Levinge, the Hon. Sir J. Lindsay, F. H. Leaf, C. C. Macdonald, J. J. MacKenzie, I. T. Pritchard, B. R. Ross, Sir Joshua Rowe, D. Smith, H. B. Simpson, Hon. E. Twisleton, T. P. Tindale, R. Watson, I. Watkins, Rev. A. N. West, J. Young, Colonel P. J. Yorke, W. Henderson, J. Botterill, S. Brown, W. Dell, J. C. Fletcher, F. Hindmarsh, G. E. Wythes, E. Webster, Captain T. P. Wood, T. Forshaw, T. Muir, T. Platt, General J. Drummond, Commander Noel Osborn, and E. Sercombe.

ADMIRALTY SURVEYS.*—The Admiralty Surveys in progress on our own shores are rendered necessary from year to year either by changes of feature from natural causes, improvements in commercial ports by dredging, and the addition of docks, piers, and other engineering works, or from the more exacting demands of steam navigation and the increased draught of ships. Those in progress in our several colonies are not less essential; and, indeed, more pressing from their rapidly expanding commerce, and from the marine surveys of earlier years failing—not from general accuracy but from insufficiency of detail—to meet the requirements of modern navigation.

Surveying parties for the past year have accordingly been steadily engaged on those parts of the east coast of Ireland; and the west, south, and east coasts of England, where marked changes of off-lying shoals or banks have been observed. Also in Jamaica, Barbuda, Gulf of St. Lawrence, Newfoundland, and Labrador coast; in Western Australia, South Australia, Victoria, and Queensland.

On foreign naval stations, three surveying ships (men-of-war) have been employed; two on the east coast of Africa, and one on the eastern shores of Japan. In Africa the urgent requirements of our cruisers engaged in the suppression of the extensive slave traffic on either side of Zanzibar, gave full employment to the *Shearwater* and *Nassau*; both ships and boats being actively at work amongst the countless reefs fringing the shores, and which hitherto have so well sheltered from pursuit the coasting-vessels engaged in the nefarious slave-trade. Commerce eventually will doubtless benefit by this opening up of the ports and anchorages of an imperfectly known coast; at present, however, a valuable surveying force is absorbed mainly in the cause of humanity, and at some risk; for the coast during several months of the year is unhealthy, and the climate in general debilitating.

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* By Captain F. J. O. Evans, C.B., F.R.S., Hydrographer.

In the sole interests of commerce the *Sylvia* has been engaged in Japan, receiving from the Japanese Government and local authorities many courteous and kindly actions for facilitating the work. This appreciation by a people who have so recently joined the comity of nations, of the value of the coast survey undertaken by the Admiralty is deserving of special record.

In the Mediterranean, and also in New Guinea, detached surveyors have performed good work: an uncharted part of the coast of New Guinea having been examined in H.M.S. *Basilisk* whilst on her homeward voyage to England, and laid down in sufficient detail for the requirements of a region so remote from civilisation and commercial routes.

The voyage of the *Challenger*, in addition to the deep-sea explorations, still furnishes valuable hydrographic knowledge, by revising errors, adjusting inadequately-reported details, and clearing away fabulous dangers in the several tracks passed over in her extended routes.

Entering more into detail as to the year's additions to hydrography, we have the following:—

Ireland.—Staff Commander Kerr and party, in a hired steam-vessel, have completed the examination of the off-lying shoal-banks between Greenore point and the Hill of Howth. By comparing this survey with that made by Captain Frazer, R.N., 1839–44, it appears that though the main forms of these banks remain unchanged, the loose surface material is constantly shifting, and that the swatchways through them are not to be permanently depended upon for navigation. Consequent on changes resulting from improvements made in the navigation of the Liffey river, Dublin bay has been re-sounded. Owing to the increasing importance of the trade with England, Lough Carlingford entrance and the approaches to Greenore have been re-examined, and some spots of shoal ground missed in former surveys closely examined. Fifteen feet is now considered the ruling depth of the engineering cut at the entrance.

England.—The constant movement of the sands in the neighbourhood of that great coast thoroughfare, Yarmouth roads, rendered an examination of the Cockle and Hewett channels necessary, more especially as our heavy draught iron-clad Channel squadron, in their periodical coast-tour, visited this locality. Staff-Commander Parsons and staff, in the *Porcupine*, skilfully executed this service; the party then working southward from Walton Naze, closely sounded the several channels and approaches of the Colne and Blackwater rivers. Following up the close examination from the shores of the South Foreland to Dungeness in 1873, the survey from Dungeness to Hastings with the outlying shoals was then completed.

Staff-Commander D. Hall, in addition to the survey of Southampton Water and its approaches, has sounded out minutely Portsmouth harbour; considerable additions to the mooring-space having been effected by dredging-operations in the last few years.

Mediterranean.—A partial blank in the recent surveys of the coast of Sicily, arising from the withdrawal of the surveying-ship, *Shearwater*, to the Zanzibar coast, has been filled up. This blank was on the north coast, and extended from Castelamare bay, in the west, to Milazza, in the east. Aided in the topography by the Italian maps (equivalent to our own Ordnance Surveys), courteously afforded by the Sicilian authorities, and sounding off to the depth of 100 fathoms, Navigating-Lieutenant Millard, in a small hired yacht from Malta, completed this nautical examination of the Sicilian shores; a duty he had been engaged on as an assistant for several past years.

East Coast of Africa.—Lieutenant-Commanding Gray and officers in the *Nassau* have completed the coast-survey from Owvou bay in lat. 9° 38′, to Cape Delgado in lat. 10° 43′ s., including detailed plans of Kiswere, Mikindani, and Mto Mtwara harbours, Mchinga and Mikindani bays, with the Lindi and Mgau rivers. Coupled with the *Shearwater's* survey of 1873 and work now in progress, the shores of this district (comprising, as it were, the focus of the coast slave-trade) are on the eve of being well charted.

The sister surveying-ship, *Shearwater*, being compelled, from the sickness of the crew and the necessity of repairing damages, to visit the Cape of Good Hope, was subsequently diverted to carry the Rodriguez Transit of Venus party from Mauritius to that remote and little-visited island. Good service to this national scientific undertaking, in addition to aiding the disembarkation and arrangements for the observing parties, was rendered by Commander Wharton and his officers. With a large number of chronometers, meridian distances were run in the *Shearwater* between Rodriguez and Mauritius; Captain Wharton further taking part in the Transit observations.

Our hydrographical knowledge of Rodriguez island, prior to the *Shearwater's* visit, was limited; and doubts existed in late years as to the extent seaward of the outlying, or rather fringing reefs. An excellent survey of the island, with its port, Maturin, and also of the surrounding dangers and the bank of moderate soundings encircling the island, was completed during the attachment of the ship to the astronomical party. After transferring the Transit of Venus observers and their stores to Mauritius, the *Shearwater* proceeded to resume her old work; examining the outlying islets Coetivy and Platte of the Seychelles group, as also the dangerous but little-known reef, La Perle, situated 11 miles seaward, or to the s.w. of Isle Platte. These useful examinations, and their reliable connection in longitude with Mauritius, together with a few well-placed deep soundings, made on the voyage to Zanzibar, form a useful addition to the Indian Ocean chart.

Japan.—Captain St. John, in the *Sylvia*, reached his surveying ground in July last; examining in the first place Sendai bay on the east coast of Nipon, in the hope of finding a harbour; according, however, to his report, "even an anchorage, except during north-easterly winds, is not to be obtained." Commencing the closer work at Itsiye Misaki, in the Kii Channel, the survey was advanced to Owasi bay, and in this spring will be continued to Matoya, and thence to Omae Saki. The weather on this part of the coast is generally boisterous and, as the main route between Yokohama and the Inland Sea here skirts the coast, good harbours are valuable. Fortunately, as Captain St. John remarks, "they are met with frequently."

Newfoundland.—Labrador Coast.—Navigating-Lieutenant William Maxwell and party, in a hired steam-vessel, steadily continue the examination in the early and late parts of the season, of the south coast of Newfoundland, advancing up the Labrador coast northward of Belleisle strait in the two available months of summer.

The east side of Placentia bay, chiefly undertaken this year to find a safe route for telegraphic cables, has been completed for a distance of 20 miles; and a detached examination of the following *frequented harbours* and anchorages, during the fishing-season, on the Labrador coast, made:—Venison Tickle, Fishing-ship, Curlew, and Independent harbours.

In the river St. Lawrence, the channel south of Crane island was also thoroughly sounded by this surveying-party, at the request of the Government of Canada.

Jamaica.—This survey, carried on in a hired schooner, under Staff-Commander George Stanley, is making steady progress. The coast between Morant and Helshire points, including Port Royal and Kingston harbours, with the off-lying soundings, have been finished in close detail and are now in the hands of the engravers. Portland bight, with Old Harbour and approaches, are far advanced towards completion.

Barbuda.—In consequence of several official reports made by Lloyd's agent at Antigua as to the defective survey—by the present Admiral Barnett—of the fringing reefs of this island, and the outlying shoal-ground (it being assumed that the dangers extended considerably seaward of those published in the Admiralty chart, and that several wrecks had in consequence ensued), Navigating-Lieutenant Hoskyn was detached from the Jamaica survey to Antigua, to examine from that island the details complained of. Mr. Hoskyn's report confirms the accuracy of Admiral Barnett's survey in all particulars, and states that the exaggerated distances from the shore of these reported dangers have no foundation. It is to be regretted that these ill-considered reports, impugning the fidelity of charts that carry on their face the stamp of authenticity, should be made. Similar reports, especially in cases of wreck, have prevailed of late years; and considering the mischief which results by weakening the confidence of seamen, together with the labour, time, and expense bestowed to test these reports—in some cases requiring a ship to be specially detached from her regular duties—the time would appear to have arrived for legal action being taken against proved offenders in this particular.

Western Australia.—In the face of many difficulties, scarcity and unwholesomeness of water being added to the track passing over extensive barren tracks of sand, Navigating-Lieutenant Archdeacon and party have succeeded in surveying the coast-line between Swan River and Jurien bay, a distance of 120 miles. He has also completed a survey of Champion bay; this bay is one of the important ports of the colony, being the outlet of a great mineral district (lead, copper, and iron), and situated in the "middle of the granary of the colony."

South Australia.—This survey, under Staff-Commander Howard and one assistant, in a hired schooner, is progressing to the north and west; the examination of the coast and outlying soundings being now extended to Streaky bay from Cape Catastrophe. Port Adelaide has been re-surveyed on a large scale, and the Investigator group off Anxious bay undergone examination.

Victoria.—Staff-Commander H. J. Stanley and party have been chiefly engaged in re-sounding the various channels into Port Phillip: owing to increasing trade and reported natural changes, this special work was performed at the request of the Colonial Government; the results justified this fresh examination, though only ten years have elapsed since the elaborate survey by the late Commander Cox was made.

Staff-Commander Stanley has also commenced a survey of Banks strait; this strait has become a largely used highway, and requires close examination. Tasmania, within whose jurisdiction this survey lies, shares with Victoria the expense falling on the colonies. It may be here re-stated that the expenses of the marine surveys of the four Australian colonies are shared by Imperial and the several Colonial governments.

Queensland.—Staff-Commander Bedwell and assistant have now completed the coast northward of Cape Palmerston, in latitude 20° 20′ s., including Broad sound; the soundings extending to the Northumberland islands are in course of completion. The great range of tide, and the rapidity with which it runs, render the examination of this particular district both tedious and arduous. Increasing colonial traffic, however, repays the labour bestowed.

New Guinea.—Captain Moresby, in the homeward route in H.M.S. *Basilisk* from the Australian station, having been reinforced from the Admiralty by Lieutenant Dawson, a well-trained and active surveying officer, has, as notified in the last year's address, followed up the exploration of Goschen strait, and also the northern shores of New Guinea from thence to Cape Rigny, near Astrolabe bay. Pausing for a few weeks in the neighbourhood of the eastern extreme of New Guinea, the scene of last year's labour, Captain Moresby commenced a close examination of the channels leading through the numerous islands and reefs forming the western part of the chain of the Louisiade Archipelago.

This excellent survey, conducted by Lieutenant Dawson, leaves *nothing to be desired* in point of accuracy: continuing from the at a depth of 630 fathoms, Professor Wyville Thomson remarks that they were greatly struck with the general resemblance between the assemblage of animal forms brought up in the net and the results of a good haul in about the same depth off the coast of Portugal or North Africa: again, on the dredgings generally between New Zealand and the Fiji group, which, with the exception of one near the New Zealand coast, were all made at depths varying from 300 to 600 fathoms; he further observes "they tend to confirm the impression that even at these comparatively moderate depths, while species vary in different localities, and different generic types are from time to time introduced, the general character of the fauna is everywhere very much the same."

In the Arafura Sea no greater depth was found than 50 fathoms, and indeed generally little more than half that depth; the bottom a greenish mud, due apparently in a great degree to the deposit from the great rivers of New Guinea and those falling into the Gulf of Carpentaria. Animal life was not abundant, and many seemed dwarfed, the fauna having somewhat the character of that of a harbour or estuary: the specific gravity of the surface-water was also unusually low. The dredgings in the moderate depths of the Banda and Celebes seas were especially successful, and many new additions to science gained.

The serial temperatures observed in the course of this voyage between Australia and China were of great interest as developing the basin-like character of the several seas passed over. In the included space, Australia on the west, and from Sandy cape to New Caledonia, thence to the New Hebrides, Solomon, Louisiade archipelagos, and New Guinea on the south, east, and north, an encircling barrier, complete to a depth of 1300 fathoms, prevents free communication with the outer ocean. Several soundings, ranging from 2300 to 2650 fathoms, were obtained in this enclosed sea, the temperature in each instance, from a depth of 1300 fathoms to the sea bottom, being uniformly 35° Fahr.

Similarly, the Banda, Celebes, Sulu, and China seas, are enclosed basins, and their waters cut off from the general oceanic circulation. In each of these seas soundings exceeding 2000 fathoms were obtained, but after a certain depth was reached, the temperature below that depth remained the same. In the Banda and China seas the uniform temperature continued from 900 fathoms to the bottom, in the Celebes sea from 700 fathoms, and in the Sulu sea from 400 fathoms to the bottom; these uniform temperatures in the four seas being respectively 37°, 36·2°, 38·5°, and 50·5° F.

INDIAN SURVEYS.—It is satisfactory to state that the resumption of the coast surveys of British India has, during the past year, been taken in hand by the Indian Government, and cordially supported by the Lords of the Admiralty. A detached party of naval surveying officers, consisting of Staff-Commander J. H. Ellis, Navigating Lieutenants Coghlan, Jarrad, Hammond, and Navigating Sub-Lieutenants George and E. W. Petley, have been placed at the disposal of the India Office, and under the immediate direction of the Superintendent of Marine Surveys, Commander A. D. Taylor, an experienced surveying officer of the former Indian Navy, and who has for some time past been maturing plans for this much-needed work. The surveys to be undertaken will embrace the seaboard of British India from the Pakchan River (in Tenasserim) on the east, to Karáchi (on the coast of Sindh), on the west, including the various groups of islands in the Bay of Bengal, and the Maldivh and Lakadivh Archipelagos.

Staff-Commander Ellis has been appointed as senior deputy to Captain Taylor. He is an officer of great experience.

The headquarters of the Survey have been established at Calcutta, and the work of equipping the necessary vessels is, it is understood, being proceeded with—one party has already broken ground at the Lakadivh Islands.

Summary.—In addition to the current work of the Admiralty Hydrographic department in issuing nautical notices, tide-tables and lists of lights, a new catalogue of the 2620 Admiralty charts has been published. During the year thirty-nine charts have been cancelled and replaced by more perfected works. Among the new charts issued may be more specially mentioned a series of four, embracing that part of the Pacific Ocean between the parallels of 37° N. and 37° S., and extending from the Philippine islands, Celebes, New Guinea, and Australia, on the west, to San Francisco and Easter island on the east. In the compilation of this series the authority for and verification in position of each islet and danger have again been carefully tested, and every reliable source of information, to the most recent date, collated. Navigators are greatly indebted to the painstaking hydrographic labours of the officers of the United States navy in this special field of research, as shown in the successive editions of 'Reported Dangers to Navigation in the Pacific.'

Of the charts published, two sheets on the east coast of Africa, extending from Panjani bay to Rás Kimbiji, including Zanzibar island and its approaches, with several plans of anchorages thence to Cape Delgado, are deserving the attention of geographers; as does also a chart of the Makrán coast (Maskat to Karáchi): and on our own shores, plans of the Menai Strait; and the coast with its navigable channels, from Orfordness to Cromer. In the south Indian Ocean the requirements of the observing parties for the Transit of Venus at Kerguelen Island and the ships-of-war detailed for the service, demanded special charts of that region and also of the neighbouring islands Prince Edward, Crozet, Heard, and M'Donald. The American and German government ships deputed for the same service profited by these timely publications.

Charts of Davis Strait, Baffin Bay, Smith Sound, with Kennedy and Robeson channels, together with several plans of ports on the west coast of Greenland, from the latest authorities, have also been prepared for the Arctic Expedition.

In all fifty-six new charts and plans have been published during the year, and 190,500 printed for the Royal Navy and general public.

Revised editions of the 'Channel Pilot,' part ii., 'South American Pilot,' part ii., and 'New Zealand Pilot,' have been published, together with the following new works:—'China Sea Directory,' vol. iii., comprising the coasts of China from Hong Kong to Korea, with Formosa and the other outlying islands; 'Persian Gulf Pilot,' a supplement embracing the Makrán coast; also 'Hydrographic Directions for Davis Strait and the West Coast of Greenland.'

ARCTIC EXPLORATION.—Unquestionably the most important subject on which I have to address the Society on the present occasion is that of Arctic Exploration, especially with regard to the progress made in the great question of the resumption of Arctic Research by England since the Anniversary Meeting last year. When my predecessor, Sir Bartle Frere, reviewed the position of Arctic matters last June, as you all remember, the question of Government action, owing to a change of Ministry, remained in abeyance, and it was stated that the Council proposed to bring the matter again before the present Ministers. Accordingly, in July, accompanied by Dr. Hooker and Admiral Sherard Osborn, I had the honour of waiting on Mr. Disraeli, and explaining our views to him in detail; and on this occasion I received his assurance that the question should be fully reconsidered during the Recess. Later in the year I addressed to him the following letter:—

"DEAR MR. DISRAELI, October 12th, 1874.

"The late announcement of the success of the Austrian Exploring Expedition under Lieuts. Weyprecht and Payer in discovering land to the north-west of Spitzbergen as high up as 83°, which is the point nearest to the Pole yet sighted on the face of the earth, has excited an intense interest throughout Europe, and especially amongst our own Arctic Geographers, who have in consequence besieged me on all sides with enquiries as to the fate of the application which I had the honour to make to you in last July, relative to a proposed Government Expedition which should leave our shores for the Arctic Seas in the course of next spring, and should endeavour to reach the Pole by way of Baffin Bay and Smith Sound. You were good enough to say at the time that you should take the matter into consideration, and would consult those departments of the Government which were interested in the question, and it is with reference to this promise that I now again venture to address you. May I announce to the Council of the Royal Geographical Society, whom I shall have to meet in a very short time, at the opening of our Autumn Session, that the papers relating to the proposed Expedition, which were handed over by Mr. Gladstone's Secretary to Mr. M. Corry, have been laid by you before the present Board of Admiralty for consideration and Report? or may I, at any rate, state that this preliminary step will shortly be taken? Pray excuse any appearance of impatience; but the Naval Authorities on my Council, who have urged me again to write to you, assert that the whalers are now returning from the Polar Seas, and that if there is any prospect of an Expedition such as is proposed in the papers above alluded to being sent out in the course of next spring, it is full time that local enquiries were made, and measures taken to obtain one or more of these vessels, and to secure the services of seasoned crews and officers. I have only further to mention that the Council of the British Association, on the recommendation of a Committee of Section E, are about to pass a resolution which will in due course be laid before you, strongly supporting our prayer for a new Arctic Expedition in 1875 as an almost indispensable sequel to the cruise of the *Challenger*.

"I remain, dear Mr. Disraeli,
"Yours most faithfully,
(Signed) "H. C. RAWLINSON,
"President of the Royal Geographical Society.

"*The Rt. Hon. B. Disraeli.*"

All the papers submitted by us to the Government, were soon afterwards referred by Mr. Disraeli to the Board of Admiralty for examination and report, accompanied by an important new chart of the Polar Regions, by Captain Evans, the Hydrographer, on which the portions discovered by the various nationalities were marked by distinctive colours; the result was, that I was favoured on the 17th of November by the receipt of the following letter:—

"DEAR SIR HENRY RAWLINSON,

"Her Majesty's Government have had under consideration the representations made by you on behalf of the Council of the Royal Geographical Society, the Council of the Royal Society, the British Association, and other eminent scientific bodies, in favour of a renewed Expedition, under the conduct of Government, to explore the region of the North Pole; and I have the honour to inform you that, having carefully weighed the reasons set forth in support of such an Expedition, the scientific advantages to be derived from it, its chances of success, as well as the importance of encouraging that spirit of maritime enterprise which has ever distinguished the English people, Her Majesty's Government have determined to lose no time in organising a suitable Expedition for the purposes in view.

"I remain yours faithfully,

"B. DISRAELI.

"*Major-General Sir Henry C. Rawlinson, K.C.B.*
&c. &c. &c."

The decision of Her Majesty's Government was no sooner communicated to the Admiralty than energetic steps were immediately taken to hasten the preparation of a Polar Expedition, so that it should be in a position to leave this country at the proper season in 1875.

Officers were dispatched to examine the men-of-war in reserve, as well as our mercantile whaling fleet, for two vessels strong and fit for navigation in Polar Seas; and on the 24th November, 1874, the Admiralty appointed three experienced Arctic officers* to form a Committee to report on the following points:—

The scope of the proposed Expedition and what instructions should be given to its leaders. The description of ships to be employed, and the various kinds of boats, sledges, fittings, stores, provisions, and clothing with which it was to be equipped. And, lastly, to recommend such arrangements as were advisable for preserving the health of the officers and men to be employed.

That Committee by the 14th February, 1875, had completed its labours, and made a lucid Report embodying its recommendations on all the points referred to, a Report which has been subsequently presented to both Houses of Parliament; but within a few days of its assembling the important question of the selection of the ships was decided, and the Admiralty authorized the immediate strengthening of H.M.S. *Alert*, 1045 tons, 381 H.P., and the purchase of the whaler *Bloodhound*,† about the same size, which was likewise immediately prepared for Arctic service. At the same time the Admiralty decided on appointing to the command of the Expedition, Captain George Nares, R.N., F.R.S., the distinguished officer then commanding the *Challenger*, and he was immediately ordered home from Hong-Kong.

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* Rear-Admiral George H. Richards, C.B., F.R.S.; Rear-Admiral Sir Leopold McClintock, K.C.B., F.R.S.; Rear-Admiral Sherard Osborn, C.B., F.R.S.

† Re-named *Discovery*.

Acting on the recommendations of the Committee, it was decided that the two ships should be manned and officered with complements, all told, of 121 souls; and it is calculated that the ships could stow on leaving England three years' provisions for the entire cruise, and a fair amount of fuel for their engines.

In February 1875, Captain Nares arrived, and had no difficulty in selecting his officers, as of lieutenants alone there were more than sufficient volunteers to have manned the Expedition. Throughout the past spring the Expedition has been most carefully equipped, travelling-gear, and provisions prepared in the most elaborate manner; and it is not too much to say that never has an Arctic Expedition been equipped in so methodical and liberal a manner, and, so far as the Admiralty is concerned, no expense or care has been spared to ensure the most perfect safety and success.

The scientific objects for which this Expedition has been so especially dispatched to the Polar Seas have been kept steadily in view. Every officer has been carefully trained to labour in some branch of science, and the Royal Society have been allowed to name two persons whom they deem especially qualified as naturalists, one of them being embarked in each of the ships. The Expedition leaves England a few days hence, accompanied by an extra ship (the *Valorous*) as far as Disco, in Greenland, so as to complete the two vessels with fuel and stores at the very threshold of their labours.

The instructions given to Captain Nares are not yet officially public; but it may be considered pretty certain they will not deviate from the recommendations of the Arctic Committee, and I assume, therefore, that we may consider the following as the programme :—

The *Alert* and *Discovery* leaving Disco some time in July, will proceed leisurely up Baffin Bay, following the East Coast up towards the entrance of Smith Sound in 78° N. They need not hurry, for previous navigators have never found the ice cleared out of that strait before the first week in August. On reaching its entrance they will make for Littleton Island, and there place records of their progress, and Captain Nares will then decide whether that island, with its adjacent shelter of Port Foulke, is to be the real base of his operations, or whether some better spot on the west side of the entrance can be selected; and his decision is to be recorded in the dispatch to be there left.

To this point, if nothing is heard of the Expedition in 1876, a ship will be dispatched by the Admiralty in the summer of 1877, to act as a depôt for the Expedition to fall back upon in case of any untoward accident to the vessels composing the Expedition.

According to the state of the ice in Smith Sound, Captain Nares will then push up north for a headland named Cape Fraser, avoiding the great elbow on the east side about Humboldt Glacier; but experience tells us that it is not likely he will find open water within Smith Sound much before the middle or end of August; and Arctic experts assure us that much of the success of this Expedition depends upon the patience and judgment of the leader at this crucial point of the voyage.

The ice of Smith Sound must be allowed time, according to the season, to clear out into Baffin Bay, and an impatient dash into this outflowing-pack may lead to the regretable accident of the ships being caught in it, and swept either on shore, or down with the ice-stream throughout the following winter into the Arctic Ocean. Happily, Captain Nares' past Arctic experience will keep him fully alive to this danger. On the other hand, winter will now be fast approaching; and it will be a race against time, in which we can only hope Providence will so far favour our seamen, that what the Americans, in Hall's Expedition, were fortunate enough to accomplish, may be granted to H.M.S.'s *Alert* and *Discovery*, and that in lat. 81° 30′ or 82° N., about Hall's farthest point, good winter-quarters may be secured for one ship on the Greenland shore. The *Alert* now alone will tackle to her work, and in whatever days of mild weather or open water may remain in September, struggle to reach a position well to the north of, but not exceeding 200 miles from her consort. By this means, and with intermediate depôts of provisions, it is calculated that the safety of the crews in their retreat, should it be necessary, to Baffin Bay will have been secured.

The advance-ship it is expected, with its crew strengthened by a portion of that of the depôt-ship, will have at least six strong sledge parties and four dog-sledges, with which to attempt the accomplishment of the main object of the Expedition, that is, eaching the North Pole. But it must be borne in mind that dge-travelling has never yet been found practicable over any considerable extent of open frozen sea, and that everything depends upon the conditions of land and water that may be found in the progress northward. The sledge-operations will commence from the advance-ship, should it have attained the high northern latitude here indicated, in early spring; and all the sledge companies will be employed in the first instance in pushing forward the North Pole party, which will be provided with at least one boat, before attending to any other exploration. Meantime communications will be kept up, if possible, by means of dog-sledges between the two ships, and Captain Nares will rejoin his consort towards the end of the summer of 1876, if his parties have returned with reasonable success from their spring journeys towards the Pole. In the latter eventuality, and if no serious accident happens to either ship, both vessels will return to England in that year; but if another season should be absolutely necessary in order to complete a reasonable amount of exploration, it may be necessary for the advanced ship to fall back towards her consort, or for the latter to retreat to a more southerly position whence a final withdrawal might be more certainly effected. Regarding these and other points, the instructions furnished to Captain Nares leaves him a free choice of action according to the circumstances that may arise.

Our own Expedition naturally occupies the largest share of our attention as far as Arctic matters are concerned, but I must not neglect to notice the increased attention now shown by civilized nations generally to Arctic enterprise. The pages of the well-known periodical, the 'Geographische Mittheilungen' of Dr. Petermann, have been again this year largely occupied by articles, illustrated as usual by excellent maps, on the results of recent Expeditions and on projects of new Expeditions. Thus Professor Höfer, the geologist of Count Wilczek's voyage, contributes a paper on the Structure and Glaciers of Spitzbergen and Nova Zembla, and Dr. Chavanne two papers on Currents, Winds, State of the Ice, &c., as bearing upon the choice of a route for reaching the Pole. Since our last Anniversary the return of the Austrian Polar Expedition from the Nova Zembla Sea, bringing news of its narrow escape from the drift-ice, in which the crew was obliged to abandon their ship, and the discovery of new Polar lands, thoroughly roused public feeling throughout Europe. It is scarcely necessary to review here the incidents of this voyage, which you heard, on the first night of our Session, from M. Julius Payer, the second in command. Suffice it to say that the Expedition was determined on in consequence of the success of Messrs. Weyprecht and Payer in the previous summer of 1871, in reaching, in a small hired vessel, a very high latitude in the Nova Zembla Sea, and finding there open water to the eastward, which led to the hope that, in spite of the adverse experience of centuries of enterprise in this direction, a passage towards Behring Straits might be found by the north of Nova Zembla. A national subscription was started in Hungary and Austria in the succeeding winter and spring, and the new Expedition, under the same officers, set sail from Tromsö in the schooner *Tegethoff*, in July, 1872, bound, not for the Polar area, but for the supposed open route past the shores of Siberia. The season proved much less favourable than in the previous year. The *Tegethoff* was caught in the drift-ice not far from the shores of Nova Zembla, and carried with it throughout the winter and the following summer, first north-east and then north-west, until it grounded on the threshold of a tract of new land or islands, in 80° N. lat. The exploration of the shores of this new Polar land by a sledge-party, under the command of M. Payer, in the spring of 1874, was the geographical result which attracted the most attention at the time. But the observations in all branches of physical science made by Lieutenant Weyprecht, and which he is now preparing for publication, will also stamp this Expedition as one of the most fruitful in important results. A summary of his work has already been published in Heft 2 of Petermann's 'Geographische Mittheilungen' of the present year, and the track of the *Tegethoff* has been elaborately worked out by Admiral Wüllerstorf-Urbair, in the 'Denkschriften der Kais.-Acad. d. Wissenschaften,' Meeting of the 10th December, 1874. Translations of both these Memoirs will be published in the next volume of our 'Journal.'

Whilst our National Expedition has been completing its final preparations, another English Arctic Expedition has been quietly equipping, with the intention of following a westerly route from Baffin Bay, and, if possible, of recovering some of the lost records of Franklin. Little at present is publicly known of this spirited undertaking, and I must limit myself here to mentioning that the name of the vessel is the *Pandora*, and that its commander is our Associate, Captain Allen Young, who distinguished himself in Arctic travelling when sailing-master under McClintock in the *Fox*, in 1857–9.

An Expedition of great interest is about to leave the shores of Sweden next month for the Kara Sea and the mouths of the Obi and Yenissei. It will be under the command of that experienced Arctic traveller and eminent savant, Professor Nordenskiold, and has been equipped chiefly through the munificence of M. Oscar Dickson, of Stockholm. It is Professor Nordenskiold's intention to quit his vessel near the mouth of the Yenissei, and to return home by land.

Our associate, Mr. Joseph Wiggins, of Sunderland, is also about to make another voyage this year to the Kara Sea and the embouchure of the Obi, and hopes to be able to discover a practicable commercial route to the Russian settlements on the lower course of that river.

Before quitting the subject of Arctic Geography it is necessary to record that, in order to place the best existing information regarding the regions to be visited in the hands of the officers of our Expedition, the Council determined on the publication of a volume of papers on the Physical Geography and Ethnology of Greenland and the neighbouring Lands. This volume is now nearly ready, and a number of copies will be sent to Captain Nares shortly before he sails from Portsmouth. It consists chiefly of reprints of a number of papers which have appeared at various times in the Transactions of Societies; but one of the most important is an original work from the pen of Admiral Collinson. Our Secretary, Mr. Markham, who has so materially contributed by his writings and activity to the revival which we now witness, of public interest in Arctic Discovery, and to whom the suggestion of this publication is due, has arranged its contents. It was originally intended to embrace information in other branches of science; but the Royal Society, when invited by us to co-operate, considered very justly, and with our entire consent, that the physical and biological portions of the work might be better treated separately and undertaken by them. The result is, therefore, two volumes of reprinted and original papers and memoranda, both of which it is hoped will be found useful by Captain Nares and the officers under his command.

EUROPE.—According to the list given in Dr. E. Behm's excellent Geographical Annual (Geographisches Jahrbuch) for 1874, there were towards the end of last year no fewer than 23 Societies in Europe exclusively devoted to Geography. The most recent of these, the Société de Géographie de Lyon, was founded in January 1873, and under the presidency of its founder, M. Louis Desgrand, has already become an active and important institution, numbering 317 members. The Italian Geographical Society continues its career of prosperity; its muster-roll now reaching the large total of nearly 1400 members. Although the veteran geographer, the Commendatore Cristoforo Negri, no longer presides at its councils, an active spirit prevails in its management; and I shall have, in another portion of this Address, to record the project of an expedition into Central Africa, from the southern borders of Shoa through the Galla country, which it has originated, and for which it is now endeavouring to procure the necessary funds by national subscription. Meantime it contributes annually various grants in aid of other expeditions, including the important one of Dr. Beccari to Celebes and New Guinea, to which my predecessor alluded in the Address of last year. In the north of Italy the zealous young geographer, Signor Guido Cora, has been elected President of the Turin Society, the *Circolo Geografico Italiano*, which numbers 140 members. Signor Cora himself has occupied his summer holiday in practical geography, having exchanged his pen for the sextant and barometer, and having crossed the Adriatic to Albania, where he has carried on a survey on a scale of 1 : 100,000 in the almost unknown interior of the country, ascending the previously untrodden summit of Mount Kudusi (6465 feet high), and tracing the river of Berat to its hitherto unknown sources in the province of Kolonia.

RUSSIAN EXPLORATION IN CENTRAL ASIA.—The Imperial Russian Geographical Society continues to increase in numbers and efficiency. On the 8th January, 1875, it numbered 1185 on its list, composed of 30 honorary members, 3 foreign honorary members, 37 foreign corresponding members, and 447 members of the affiliated societies of Siberia, the Caucasus, the North-western Provinces, and the South-west. On examining the balance-sheet of this society, we find that in 1874 it received a subsidy of 15,000 roubles (about 2000*l.*) from the State treasury, and that the subscriptions of its members amounted, in the same year, to 2950 roubles (about 400*l.*). Besides these ordinary sources of revenue, its extraordinary revenue was augmented by grants from the State treasury and from private individuals for special objects. Thus in 1874 a sum of 20,000 roubles (2800*l.*) was given by the Government to defray the cost of the Amu-daria Expedition, of which about half was devoted to meteorological investigations on the Lower Oxus. 15,200 roubles (2000*l.*) were given by Golubkoff for the publication of a Russian edition of Ritter's 'Asia;' and 10,000 roubles (1400*l.*) by the State for the levelling of the Ust Urt between the Aral and Caspian seas.

During the past year no less than 6 important expeditions were under consideration, viz.:—

1. The Amu-daria expedition.
2. The expedition to level the Ust Urt, between the Aral and Caspian seas.
3. To investigate the Usboi, or dry bed of the Oxus.
4. The Olonek expedition.
5. Mikluko Maklay's exploration of New Guinea, and
6. Ogorodnikoff's journey in North-eastern Persia.

1. The first of these expeditions, an account of which will be found below, was organised by a special committee, with the co-operation of General Kaufmann, and received the Imperial sanction.

2. The second successfully accomplished its work, with the aid of a staff of trained surveyors, under the command of Colonel Tillo. They ascertained the height of the Aral Sea * to be considerably greater than previous observations had reported it to be; and thus claimed to have established the possibility of diverting the Amu-daria into its former channel, which debouched in the Caspian; and, lastly, they described the configuration of the Ust Urt plateau, which is not so flat as was supposed, between the Aral and the Caspian. Its greatest height is about 15 miles west of the Aral, where it attains an elevation of 519 feet above that sea, or about 677 feet above the level of the ocean. Hence it gradually slopes towards Lake Kerbulak; that part which includes Lakes Asmantai and Sam is only about 100 feet above the level of the Aral (343 above the Caspian), and forms a hollow which opens out at Mertwi Kultuk Bay; while the belt of higher ground near the Aral, about 35 to 40 miles wide, unites the northern Chink with the Ust Urt proper.

3. The expedition to investigate the Usboi, or desiccated bed of the Oxus, was indefinitely postponed for political reasons.

4. The Olonek expedition during the course of last year surveyed the lower Tungusska; reporting on the hydrography and topography of that region, and making some important changes in

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* The mean of two series of levellings across the Ust Urt from the Aral to the Caspian gives 74 mètres, or 243 ft. Eng., as the difference between the height of these seas. According to Berg's measurement, in 1826, the height of the Aral *above the Caspian was estimated* to be only 117 ft.

its cartography. Müller, who was attached to this expedition, conducted a series of magnetic observations, which refute the theory of the Swedish professor, Gauss, as to the position of the Siberian magnetic pole, which was placed by him in about 71° N. lat. and 119° 20′ E. long. from Greenwich, *i.e.*, according to the map, very near the River Olonek. Müller discovered that, as he travelled in a north-easterly direction from the River Moniero, towards the Olonek, the magnetic intensity diminished. His observations coincide with those of M. Dové, Hansteen's companion, and he assigns, therefore, as the probable position of the magnetic pole some point between Vilnisk and Olonek, approximately between 64° and 65° N. lat. and about 112° 20′ long. E. of Greenwich, or nearly 7° S. and 7° W. of the position assigned by Gauss.

The Olonek expedition will be continued this year, during which explorations will be made in the basins of the rivers Hatanga and Anabara.

5. Mikluko Maklay's explorations on the Papuan Koviai coast of New Guinea have been mentioned before.

6. Lastly, Ogorodnikoff was compelled to return home after proceeding as far as Meshed, whither he travelled by the well-known high road, which passes through Astrabad, Shahrud, Sebzevar, and Nishapúr. The reason assigned for the abandonment of his meditated journey eastward was the disturbed state of Afghanistan.

The ethnographical map of Russia, edited by Rittich, was completed last May, and, together with the same author's ethnographical map of the Caucasus, is the most important and best-executed work of the kind ever produced in Russia. One of the first engraved copies will be exhibited at the Paris Exhibition this year.

Another important work has been the publication of Prejivalsky's travels,* the first volume of which, containing the general narrative and particulars regarding the geography, ethnology, and botany of the countries visited, appeared at the commencement of this year; and will be followed next year, and the year after, by two more volumes, comprising the more strictly scientific results of the expedition. The Council of the Russian Geographical Society have voted 10,000 roubles (1400*l.*) towards the expense of publishing these travels, which, it will be remembered, were prosecuted into Northern Thibet, almost to the foot of the great mountains, into regions unvisited by Europeans since the journey of the Abbé Huc and Gabet, and of which our knowledge is very insufficient.

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* 'Mongolia and the Country of the Tanguts.'

A work of a similar nature, viz. the Travels and Researches of the late M. Fedchenko in Turkistan, is being published by Madame Olga Fedchenko, the widow of the traveller. The 3rd Part of vol. ii. was published in 1874, and Part 4 in the present year. These parts, each of them forming considerable volumes in quarto, and richly illustrated with coloured plates, form the scientific Appendices to the narrative, and the work will constitute, when completed, a lasting monument to the memory of a promising young traveller too early lost to science and his country.

Another important publication during the past year was the translation into Russian of Ritter's 'Iran,' annotated by the well-known geographer, M. de Khanikof, and supplemented by some important articles by Professor Spiegel on the cuneiform inscriptions of Persia.

In my opening Address at the beginning of this Session, I alluded to the Amu-daria Expedition, some further details of which may be found interesting.

It will be remembered that in the end of May, last year, all the members of the Expedition were assembled at Kazala, on the Syr-daria, whence they proceeded in two steamers (the *Peroffsky* and *Samarkand*) by the Aral Sea to the delta of the Amu-daria, which they entered by the Kitchkineh-daria mouth, and ascended the Ulkun-daria for a distance of 55 miles from the bar without any great difficulty, finding the depth of channel to vary from 3½ to 8 fathoms. Above this point the river divides into numerous channels, which cause a great waste of its waters and increase the difficulties of navigation. Ascending by one of these channels as far as Mount Koshkana-tau, the passengers landed, as further progress was impossible, owing to the shallowness of the stream and the thick growth of reeds which fill the bed of the river.

Here it was decided to divide the surveyors into three parties,* to each of which was assigned a certain task which, it was surmised, would take from 105 to 120 days to fulfil. In the mean time, as it was of the utmost importance to find a navigable channel from the embouchure of the river to its upper course, the steamer *Peroffsky* was directed to descend the river, coast along the shore to Tustchibas Bay to the east of the delta, and endeavour to make her passage up the Yani-su and Kuvan-Djarma to the main channel of the river near Nukus. In this she was perfectly successful. On the $\frac{\text{18th}}{\text{30th}}$ July the *Peroffsky* crossed the bar of the Yani-su, and on the $\frac{\text{24th July}}{\text{5th August}}$ arrived at Nukus, after meeting Colonel Stolétoff and Major Wood, R.E., at Lake Dau-kara. From Nukus to Petro-Alexandroffsk, and from thence to Meshekli, on the Bokharian frontier, the navigation was comparatively easy.

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* The first party took an easterly direction, descending the Purhan Channel to the mouth of the Yani-su, and thence along the sea-shore past the fort of Ak-Kala to the mouth of the Taldyk; the second also proceeded east to the Purhan, then up this stream and the Kuvan Djarma to Nukus, thence descending to Ak-Kala, and thence by the Souma Channel towards Kungrad, and past that town to the mouth of the Taldyk; the third went to Kushkana-tau, and by the bank of the Ulkun-daria to Ak-Kala, returning to Kushkana-tau and by Nukus to Meshekli, on the Bokharian frontier.

Thus was inaugurated a work, the importance of which it is impossible to overrate, promising, as it does, to make the Oxus once again a great commercial highway, and thus to open a new era of civilization and progress, under the auspices of Russian rule, for ancient Kharesm, after so many centuries of slumber and decay.

The work of surveying was actively prosecuted in the whole delta defined by the Chartam-bai and Ulkun-daria on the one side, the sea-coast on the other, and the Yani-su and Kuvan-Djarma on the third. Levellings were further continued along the Yani-daria to Peroffsky, on the Syr, and up the Amu-daria to Meshekli.

We must now briefly notice some of the labours of the other members of the expedition. Before leaving Kazala, MM. Severtseff and Smirnoff had the misfortune to lose, by death, the topographer attached to their party, and after vainly trying to replace him, they set out on the $\frac{\text{12th}}{\text{24th}}$ June for the west shore of the Aral Sea. Their chief object was to correct and supplement Severtseff's previous observations in 1857 on the desiccation of that sea. They have now established beyond doubt the fact of the continuous decrease of the Aral Sea, as its waters recede from the west shore. Large bays, marked on previous maps as full of water, are now dried up, and in some places overgrown with brushwood. Old shore-lines are distinctly traceable by the different belts of vegetation which mark the more or less recent period at which they were left uncovered by the sea. A curious circumstance may here be noticed with regard to these explorations which may interest physicists, viz. that the wells nearest the sea-shore, in some cases so near as almost to be within the wash of the waves, contained fresher and purer water than those at a little distance inland. This apparent anomaly is thus explained by Severtseff:—These wells are supplied from two sources: 1. The sea-water filtering horizontally through the sand. 2. The aqueous atmospheric deposits (*e.g.* rain and snow) on the land. These two elements of supply, freed from salt by a natural process of filtration, combine to produce excellent drinkable water; but as soon as the sea has receded a little distance from the wells, and sandbanks are formed which obstruct the drainage of the land, the well-strata (which are at an inconsiderable depth) become saturated with salt and do not admit of the filtration of the water, which then becomes bitter and unpalatable to the nomads, who desert these wells for others nearer the sea. With reference to that vast expanse of hillocky sand marked on our maps as the Kizil-Kum (comprising the region bounded on the north and north-east by the Syr-daria, on the east and south-east by the hills in the north of the Khanat of Bokhara to the right of the valley of the Zarafshán, on the south by the lower Amu-daria, and on the west by the Aral), forming, in pre-historic times, part of the bed of a great sea, which has since been gradually transformed into dry land by a similar process to that which is now in operation on the east shore of the Aral sea, the Russian savant Severtseff assigns three successive periods:—(1.) The formation of the dunes or sandbanks by the action of the waves; (2.) The growth of brushwood, clumps of tamarisk being the first to appear; (3.) The gradual covering of the whole with sand-drift, which is continually encroaching westwards as the sea recedes.

For a critical study of the whole question of the Aralo-Caspian plains, I can refer the reader to Baer's 'Kaspische Studien,' where the subject is exhaustively treated. I will only add that it is greatly to be desired, in the interests of science, that the Russian Government should cause an accurate topographical survey to be made, with as little delay as possible, of the east shore of the Aral, so as to enable future explorers to conduct their observations on a sure basis.

M. Soboleff, another member of the Amu-daria Expedition, has communicated some interesting particulars of the results of his ethnological and historical enquiries. On arriving in the Delta his first visit was to Chimbai, 30 miles overland from Kushkana-tau, the central gathering place of the Karakalpak tribe, and one of the most important market-towns on the Lower Amu-daria, ranking next in importance after Urgendj, in the Khanat of Khiva, and visited by as many as 7000 people. Soboleff directed his researches to the east and west of Chimbai; he noticed that all the ruins to the west of Kushkana-tau were of comparatively recent construction, and had been destroyed within the last few years, while those to the east of Chimbai seemed to be of high historical interest. Such, for instance, are the ruins of the town of Ak-kala (7 miles east of Chimbai), formerly the seat of the Uzbek tribe of Masyd, and destroyed by Nadir Shah in the first half of the eighteenth century; and, secondly, the town of Bagdad, 20 miles to the east of Chimbai, also demolished by the Persian invaders. Soboleff confirms the opinion entertained by some geographers before the late explorations that the Yani-daria (*i.e.* new river) is of most ancient origin, and served at one time to unite the Jaxartes with the Oxus.

Whether it will be possible in the future to re-unite these great rivers and utilize their combined streams (still further swelled by an economical system of irrigation in the Khanat of Khiva) in diverting the Oxus into its old channel, so as to establish uninterrupted communication between the heart of Central Asia and European Russia by the Volga and Caspian, is one of those questions not only of the highest interest to all geographers, but one which, allied with a great many others, closely touches the supremacy of Russia in her lately acquired possessions, and indirectly affects the future prosperity of the whole continent of Asia.

It may be remembered that some years ago I was engaged in a sort of amicable controversy with my predecessor in this chair on the subject of the hydrography of the Aralo-Caspian basin, and that Sir Roderick devoted no less than 14 pages of his Anniversary Address for the year 1867 to an elaborate refutation of my views regarding the former desiccation of the Aral Sea. It is unnecessary at the present time to restate the arguments, drawn from a very extensive examination of contemporary records, which led me to believe that, at different periods of history, the Oxus and Jaxartes having been drained off into the Caspian, the bed of the Sea of Aral had been dried up by evaporation; but I may say generally, that the result of the Russian topographical surveys, and especially of the levelling operations undertaken about the delta of the Oxus, has been to confirm my previous views. I now see very good ground for believing that the original course of the Oxus having passed in a westerly direction to the Caspian, between the 39th and

40th parallels of latitude, and the Jaxartes having flowed into the same sea along what is now called the Usboi, the Greek geographers, who navigated the Caspian, were right in laying down independent mouths for the two rivers and in measuring the distance between them. The whole subject, however, of the Aralo-Caspian hydrography will very shortly be brought before this Society in an exhaustive paper which Major Herbert Wood, Colonel Stoletoff's companion in the recent Russian survey, has submitted to the Council for publication in our 'Journal,' to which I propose to append a series of extracts from the Oriental geographers that have never been before translated. As the fullest information on all details of the physical, as well as the comparative geography of these regions will thus be very shortly in the hands of the Fellows, it seems unnecessary to anticipate the interest of Major Wood's paper by a further reference to the Russian discoveries.

PALESTINE.—Major Wilson (Director of the Topographical Department of the War Office) informs me that the survey of Palestine has made satisfactory progress during the past season, notwithstanding constant interruption from the state of the weather during a season of unusual severity, and the illness of several members of the surveying party. The triangulation has been extended southwards from Hebron to Beersheba, and the position of the wells at the latter place has been accurately determined, giving a fixed point of departure for the route surveys of travellers in the Negeb and desert, and affording satisfactory proof of the general accuracy of Messrs. Palmer and Drake's survey, which was based on the Ordnance Survey of Sinai.

The district covered by the triangulation, which includes the wilderness of Judah and the hill country between Hebron and Beersheba, has been surveyed and plotted on a scale of one inch to a mile. The examination of this section of the country, which has rarely been visited by travellers, has yielded very valuable results; numerous ancient sites have been recovered, and great light has been thrown on several difficult questions connected with Biblical topography. Some of these results have already been published in the quarterly statements of the Palestine Exploration Fund, whilst others await publication. The survey is now in progress in the plain of Philistia, and Lieutenant Conder, R.E., who has entire charge of the survey operations, hopes to complete the survey of the whole of Palestine lying west of the Jordan during the spring of next year.

At the last meeting of the British Association at Belfast a sum of 100*l.* was granted for the special object of ascertaining accurately the depression of the Sea of Galilee, by a line of levels from the Mediterranean, and the actual fall of the Jordan from the lake to the Dead Sea. Instruments have been lent for this purpose by Lieutenant-General Sir Henry James, R.E., and the work will probably be commenced in June.

The Palestine Exploration Fund have to deplore the loss of Mr. C. F. Tyrwhitt Drake, who died in harness at Jerusalem in June last, from fever contracted during the progress of the survey, and it is hardly possible to over-estimate the services which he rendered to the fund. Amongst the obituary notices will be found a record of Mr. Drake's contributions to geography. The survey has also lost the services of Sergeant Black, R.E., invalided from ill-health, who has from the commencement taken a prominent part in the triangulation of the country, and who for some time was in sole charge of the survey. On the death of Mr. Drake, Lieutenant Kitchener, R.E., was appointed to the survey, and he has already rendered Lieutenant Conder valuable assistance in the prosecution of the survey in spite of a severe attack of Syrian fever.

During the past season the Palestine Exploration Fund were able to avail themselves of the services of Mons. Clermont Ganneau, whose name is well known in connexion with the Moabite Stone. Mons. Ganneau has, since his return to this country, communicated an original and very suggestive paper on the origin of the native population or *fellahin* of Palestine, and the results of his mission are to be published during the course of the year.

The American survey of the country east of Jordan has been in abeyance for some months, and with the exception of a paper by Professor Paine, no notice has yet been published of the results obtained by the first expedition under Lieutenant Steever, U.S. Engineers. A sum of 12,000*l.* has recently been raised, and operations are to be recommenced at an early date.

A German party under Professor Dr. Sepp is at present engaged in an exploration of some portions of Phœnicia.

PERSIA.—In Persia and the adjoining countries the interests of Geography have been well supported during the past year. While Captain Felix Jones, on the one side, has been working steadily at his great map of the countries between the Persian Gulf and the Mediterranean—a work which is now approaching completion, and the publication of which will form an epoch in our knowledge of the geography of Western Asia—Major St. John, on the other, has finished, and sent to the engraver, his not less comprehensive map of the regions intervening between the Turkish frontier to the west, and Afghanistan to the east. There have been other labourers also in the same interesting field. Sir Frederick Goldsmid, who is himself a Persian traveller of a large and varied experience, has done good service to Geography in collecting the scattered notes of the journeys which were performed thirty-five years ago between Khiva, Merv, and Herat, by Taylour Thomson, James Abbott, and Richmond Shakespeare, and in embodying these notes in a lecture which he delivered before the United Service Institution early in the year, and which he further illustrated with a map presenting, for the first time, in a correct and intelligible form, an outline of the geography of the "Debatable Land" on the Perso-Afghan and Turcoman frontier. Colonel Valentine Baker again, whose journey between Asterabad and Meshed, in company with Lieutenant Gill, R.E., was duly notified in my predecessor's address of last year, has recently submitted to the public the results of his personal observations, as compared with the Russian surveys and all other available documents, in an elaborate map of the North-eastern frontier of Persia, constructed by Messrs. Stanford and Co., which exhibits the entirely new feature of a north-easterly prolongation of the Elburz mountains, with peaks ranging from 8000 to 11,000 feet, and running in an unbroken chain from Kelat-i-Nadiri, almost as high as Kizel Arvat on the 39th parallel of north latitude. But by far the most complete and trustworthy guide for the geography of the Atreck river and the valleys and passes which indent this Elburz chain between the Atreck river and the Turcoman steppe, along the watershed which is claimed by Persia as her northern border, is to be found in the exhaustive report which has just been sent home of Captain Napier's journey through the hills from Meshed to the Caspian, a document of extreme importance, and which I hope to obtain permission to publish in the next volume of our Journal. Captain Napier's report, I may notice, furnishes additional evidence that the Oxus river originally flowed easterly along the 39th parallel (approximately) from the neighbourhood of the modern Chargúí to the point where Arthur Conolly discovered and examined the old bed between Meshed-i-Miriam and Kizil Arvat; the great river thus cutting off and absorbing in its course the Marghus and Ochus of antiquity, now represented by the Murgháb and the Tejend, both of which are lost in the desert.

A further accession to our knowledge of the geography of Persia, especially in regard to the almost inacessible mountain chains of the interior, is to be expected from the mission of Dr. Andreas, a young Orientalist of great promise, who has been sent out by the Berlin Government to investigate the antiquities of the country generally, and who, having abundant time and means at his disposal, as well as the requisite knowledge for conducting researches, is prepared to visit every nook and corner through the length and breadth of the land in search of sculptures and inscriptions which may have escaped the notice of former travellers.

Great Trigonometrical Survey of India.—This Survey has, under Colonel J. T. Walker, R.E., F.R.S., &c., been even more than ordinarily busy during the last year, and the record of its work, which he has drawn up, embraces a very large number of interesting and useful operations for geodetical, geographical, and general purposes.

The Trigonometrical Survey has always been essentially a pioneer and guide to all the military, civil, and survey operations of the Indian empire. During the last year it has preserved the same character, its almost ubiquitous activity invading the desert in the west, the Oxus and Eastern Turkistan in the far north, and Great Tibet and Assam in the extreme east; while at the same time it has sought to pass still farther south by crossing the Straits of Manar between Cape Comorin and Ceylon on the one hand, and by advancing from British Burmah on the other, so as to pass down the whole of the Malayan Peninsula as far as our flourishing emporium at Singapore.

During the last year the great triangulation has been extended over 7190 square miles, with 8862 square miles of minor triangulation for topographical and other purposes, while over a further area of about 12,000 square miles exterior to the above a number of peaks and points have been fixed, thus making a grand total area of 28,052 square miles, over which a great number of points have been accurately fixed, and which are now available for general survey and geographical purposes, maps, &c. Already many of those fixed in the ranges to the north of the Assam Valley (which are inhabited by independent tribes), have been found very serviceable both in the military and in the geographical operations which were carried on in connection with the expedition against the Duffla tribe; other points to the south of Assam have no doubt also proved useful to the Nágá Expedition, which has since been carried out.

In addition to the triangulation, topographical surveys for maps were made of an area of 3653 square miles on various scales in the Himalayas and in the Bombay Presidency, and extensive geographical explorations were made in Eastern Turkistan or Kashgaria, on the Pamir Steppes, and also in great Tibet and Nepaul.

An important feature in the triangulation has been the resumption of operations in Burmah, which will afford a basis for the Topographical and Revenue Survey operations in that country, and which will connect Rangoon and Prome with the triangulation of India, and thereby remove the doubt which has hitherto existed as to the longitude of those important places. Eventually the triangulation will be carried down the whole of the Malayan Peninsula.

The completion of the revision of the southern section of the Great Indian Arc is another important feature; thus putting the whole of that great chain of triangles (which now extends from Cape Comorin to the Himalayan Mountains) on a par with, if not, as is probable, on a superior footing to, that of any other triangulation in the world.

The pendulum observations which were so unfortunately interrupted by the death of Captain Basevi have been completed, and the final results are now being computed for publication.

Assistance was rendered in connection with the observations for the Transit of Venus, which was independently observed by Mr. Hennessey of the Trigonometrical Survey with very successful results.

Another most interesting operation has been in progress, viz., that for observing the tidal constituents at certain points in the Gulf of Kutch (North of Bombay), so as to determine whether the supposed variations in the relative levels of the land and sea are now actually taking place or not. In some cases the variation has been stated to be very considerable, points formerly near the sea being now a long way from it, and in other cases the sea having encroached upon the land; while all this variation is supposed to have happened within very recent times.

Some progress has also been made with the spirit-levelling operations; the work carried out in the present year having more especially in view the connection of the various lines of levels in Madras on canals, railroads, &c., so as to reduce them to one common datum, and thereby to make them available for general purposes, and for new projects; which has hitherto been impossible, owing to each line having started with a different origin.

The triangulation of the southern section of the Great Arc was carried on under Major Branfill. He encountered very great difficulties, and it was only by using very long sides that he was able to advance across the dense jungle-clad mountains of Southern India, which had baffled Colonel Lambton at the beginning of this century. One of the stations for junction with the Cape Comorin Base Line (which was measured in 1868–69) was found to have been carried away by the movement of the sandhills on which it was built, though its foundations had been placed ten feet below the surface.

By his skilful arrangements and energy, Major Branfill succeeded in connecting his work with the Cape Comorin Base Line, thus completing the Great Arc down to latitude 8°. The general outturn of work was excellent; and, in addition to the stations of the great triangulation, a number of high and important hill-peaks were fixed in the almost unknown portions of the southern end of the Western Ghats.

The error of the triangulation on closing at the measured base near Cape Comorin was found to be barely appreciable, though the computed value was brought down all the way from Calcutta, viâ Madras and Bangalore, a distance of about 1400 miles. The error indeed amounted to no more than a quarter of an inch in $1\frac{7}{10}$ mile, a most satisfactory result, on which Colonel Walker may be justly congratulated, since it shows with what wonderful accuracy modern instruments and the scientific methods adopted on the Indian survey enable geodetic operations to be carried out. The error generated at the end of 1400 miles was thus found to be only two and a quarter millionths of the length measured.

A plan for connecting the great triangulation of India with that of Ceylon has been also matured in communication with Colonel Fyers, R.E., the Surveyor-General of Ceylon. Carrying the triangulation across the Straits of Manaar is of course the great difficulty in completing the connection, owing to the configuration of the coasts and islands.

The triangulation in Assam has at the same time proceeded satisfactorily under Mr. W. G. Beverley, having been advanced through the forest-clad plains on the south bank of the Brahmaputra River to within a few miles of the civil station of Sibsāgar, which has brought the triangulation within 80 miles of Sudya, the most easterly station of Assam. Great difficulties were experienced owing to the heavy jungle-trees and gigantic grass, and also in a great measure owing to the paucity of population, labourers for all purposes requiring to be generally imported from a distance, together with their food and materials for the construction of stations. In order to avoid the great difficulties arising from having to cut paths through the jungle and grass, Colonel Walker devised a very ingenious modification in the construction of the stations of observation, utilising the wood which is so abundant in Assam by making lofty tripod-stands for the theodolites with an isolated platform for the observer, by means of which he was able to see over the high jungle and grass, the stalks of the latter being 12 to 15 feet in height, and more than 3 inches in diameter, requiring to be cut stalk by stalk, as if they were saplings. Mr. Beverley reports that these stands, from the rapidity with which they can be constructed, have helped materially to advance the Survey. Next season a further improvement is contemplated by an arrangement for raising the signals to a considerable height above these stands, by which no doubt the mutual visibility of the stations will be greatly facilitated.

Mr. Beverley fixed the points in the Duffla Hills to the north of Assam, and also in the Nágá Hills to the south-east, both of which operations, as already stated, have proved to be exceedingly useful. Altogether, considering the obstacles, great progress was made.

The Brahmaputra series of triangles, which has been in progress latterly under Captain Carter, R.E., has been brought to a successful termination by that officer. This series, on the meridian of 90°, runs mostly along the last southern bend of the Brahmaputra River between the point where it leaves Assam and the point where it is joined by the Ganges. Lying for the most part in alluvial plains covered with trees and jungles, it has only been carried out by a very large amount of hard work and exposure. Lofty towers had to be erected, and the intermediate lines had to be cleared of trees and jungle, which necessarily made the progress slow.

Taking the field at an early date, Captain Carter succeeded in doing a very large amount of work during the last season, and he had the further satisfaction of bringing the work to a close by joining on to the triangulation on the north. He also arranged so as to fix the positions of all points of importance in the vicinity of the triangulation, but owing to the want of boundary pillars, or other permanent marks in that part of Bengal, he had to content himself with fixing the temples, and also those remarkable banyan-trees, under which the villagers hold their markets. These determinations may be hereafter utilised when the Government of Lower Bengal succeeds in erecting permanent pillars at the points of junction of three or more villages, as is the good custom in Bombay, the North-West Provinces, in the Punjab, and other parts of India, to the manifest benefit of the population, since boundary disputes are thereby reduced to a minimum, and there is always something fixed to start with if any such dispute arises. Under the numerous difficulties noted above, as well as of those arising from a tropical climate and an atmosphere pervaded for months with smoke and haze, it is highly creditable to Captain Carter that he brought the work to a successful conclusion in such a short time.

Another chain of triangles has been in progress in the West, viz., the Jodhpur series, under Captain J. Hill, R.E., which is to be carried across the Bikaneer Desert, in order to join into a side of the Sutlej series. The operations of the year lay in the districts of Marwar and Jesalmīr, through the desert tract which has been called "the Region of Death." Happily the Survey party found, during their sojourn in it, that the tract was not deserving of so grim an epithet when proper precautions were taken to provide food and wholesome water—objects which the party secured by a judicious use of camels, which fortunately abound throughout the country. This region is, however, much dreaded by the people of the more favoured districts near it on account of its desolate appearance, the frequency of famines, combined with the distress and disease that are generally prevalent among the poorest classes of its inhabitants, owing to the miserable food and unwholesome water on which they are compelled to subsist. The desert in the tract between the Sutlej and the Aravulli Mountains, comprising the Bikaneer and neighbouring deserts, has always been a curious geographical feature of Upper India; and though it has been partially explored earlier in this century, and more recently has been traversed both in its eastern and southern margins by the great triangulation, there are still many interesting points with reference to its physical features which it is hoped the series now under notice will go a long way towards solving. One of the most important, viz., as to how the drainage of that great tract was formerly effected, will no doubt be elucidated from the heights of the various trigonometrical stations as determined by the operations; and we may possibly learn a good deal as to the old course of the Saraswati and the Gagur rivers, which are now lost in the sands of the desert, as well of the other larger rivers, which are supposed to have also flowed through portions of the desert.* Some further information will no doubt be gained as to the desert proper, and as to whether it is increasing or diminishing.

As far as the triangulation has gone, the desert was found to be covered with sandhills, which are generally flat-topped and low, and of about equal altitude, whereby the triangulator lost the advantage of a hilly country; though, on the other hand, he gained not a little from the absence of vegetation, and thereby escaped the tedious necessity of cutting lines through the jungles, as is necessary in Assam, &c. Occasionally observations were delayed when the atmosphere was pervaded with dust and sand, though not to any great extent. Arrangements are being made to extend the triangulation by longitudinal chains of minor triangles to be carried across to the Indus, so that all parts of the desert will be touched upon, and our knowledge of this extraordinary tract will, it is hoped, be as complete as can be expected, considering its physical nature and sparse population. The out-turn of work in this tract by Captain Hill and his assistants was highly creditable.

The Trigonometrical Survey Report next carries us from this extreme Western District, in longitude 72°, to the extreme Eastern ground of the Survey, viz., that of Burmah, to the east of longitude 96°; here the Eastern frontier series of triangles, which in former years was carried through the Kossiah and Tipperah Hills and down the east coast of the Bay of Bengal, skirting the Loshai Mountains, passing through the districts of Chittagong, Akyab, and Arracan, and stopping just short of Pegu and Rangoon,—has been resumed, and is now being energetically advanced by Mr. Rossenrode.

Starting with a new set of elephants, the only carriage available in Burmah, the party had not a little preliminary difficulty in training these animals.

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* A curious and important Paper has recently been published in India upon this subject, under the title of 'The Lost River of the Indian Desert,' in which good grounds are shown for believing that the Sutlej formerly left its present bed near Ludiánah and flowed through the desert to the Indus at Arore, absorbing in its course the Saraswati, Gagur, and other minor streams, and spreading fertility through the rich and holy district of Kurukshetra.

Some idea of the vigour of vegetation in Burmah may be gained from the fact that, during the four years which had elapsed since the operations were abandoned, the roads to the forward stations, which at that time had been cut so as to be perfectly clear, were so completely overgrown by jungle again that a stranger might have thought no clearance had ever been made.

As usual in the winter, in densely forest-clad countries, the atmosphere was obscured by thick haze and smoke, owing to the annual burning of the jungles. Hills even, which were only five miles distant, were obscured for weeks at a time; the observers having thus to remain at one station for nearly two months, watching in vain by night and day for glimpses of signals which, though luminous—*i.e.*, either heliotropes or lamps—were never visible until a shower of rain cleared the atmosphere.

Arrangements have been also made for determining the positions of Rangoon and Pegu; the longitude of the former being more especially a matter of importance, as it now is the port for a very large amount of shipping.

The topographical surveys in Guzerat and Kattiwar, under Major Haig, R.E., and Captain Pullan, have made good progress.

Colonel Walker, who has from the very commencement of the new topographical operations in Guzerat attempted to combine the work with that of the very detailed survey of the Revenue surveyors which had been previously made, is at last able to report that his endeavours have met with the success they deserved. He has, in conjunction with Major Haig, R.E., devised a practicable plan for utilising all that was done before, though unfortunately the previous work, in a utilitarian spirit, had been confined to the Revenue-paying portions of the country only, and the separate pieces had not been so connected together as to form a map available for reference.

The system adopted is a most ingenious one, and meets all the difficulties of the case. Major Haig is, fortunately, well supported, and it is gratifying to see that one of the latest added officers to the Great Trigonometrical Survey, viz., Lieutenant Gibbs, R.E., already shows that he has taken up his work in the same spirit as his seniors; his report on a portion of the deadly Dāng forests being more especially interesting, as it refers to an almost unknown portion of the Ghats which is inhabited by a wild race still using bows and arrows, and who, spite of the temperature, which for most months of the year is over 100° in the shade, drink strong liquor from morning to night.

The next subject reported on is the survey of the various Himalayan Provinces; and in order to appreciate the magnitude and importance of this gigantic undertaking and its present position, it will be as well to quote Colonel Walker's own words, which are as follows, viz.: "The Himalayan Mountain Ranges may, for geographical purposes, be broadly divided into two portions, one lying to the east, the other to the west of meridian 81°. The eastern portion includes the Nepaulese territories, Sikkim, Bhootān, and the ranges to the north of the Assam Valley, which are occupied by independent hill-tribes; in this (eastern) portion most of the prominent peaks have long since been fixed by the operations of this Survey, but only a very small area has been regularly surveyed, and under existing political conditions any considerable extension of survey operations is impossible. The western portion, on the other hand, has long been freely accessible to Europeans, and regular surveys of the entire area included between the plains of Hindostan on the south, the frontiers of Eastern Turkistan and China on the north, and the tracts occupied by independent hill-tribes in the Valley of the Indus, on the west, have now been all but completed. These surveys have been executed on various scales, and at various times, by members of the Trigonometrical Survey.

"First the districts of Kangra, Lahaul, and Spiti, and the native States of Chumba, Tiri, Gurhwāl, &c., which embraced an area of 26,700 square miles, were surveyed during the years 1849–54, under the direction of Sir Andrew Waugh, in order to produce maps in the $\frac{1}{4}$-inch scale. . . . .

Then the survey of the territories of the Maha Raja of Kashmir was commenced, and an area of about 21,800 square miles was completed in Kashmir and Jammū on the $\frac{1}{2}$-inch scale, but with much more topographical detail than had been given in the preceding survey; and after this the operations were extended over the remainder of the Maha Rajah's territories, but on the smaller scale of $\frac{1}{4}$-inch to the mile, which was adopted for an area of about 52,000 square miles, comprising the whole of Ladak, Little Tibet, and the regions up to the Northern boundary line, and a portion of Chinese Tibet beyond. These operations were carried on during 1854–64, and were initiated by Sir Andrew Waugh and carried out by Major Montgomerie.

"Lastly, a survey of the British districts of Kumaon and Gurhwāl was commenced in 1865 on the scale of 1 inch = 1 mile, and it is now nearly completed; the Western frontiers of Nepaul have been reached and surveyed to the farthest points visible from our own side of the frontier; the area completed amounts to 9520 square miles, and 270 outside the districts; the area remaining, amounting to 3200, is situated in the higher ranges and regions of perpetual snow which lie to the north towards the frontier of Chinese Tibet, and much of it may be surveyed on a smaller scale."

The Kumaon and Gurhwāl survey was carried out by Major Montgomerie, Captain Carter, and Lieutenant Hill.

All the Western Himalayas having in this way been provided with maps on various scales, and with a various amount of detail, the next point which has been pressing is to supply the purely British districts, which were surveyed in the earlier days on a small scale, with a modern detailed survey on a scale suitable for local requirements; a point which, by the orders of Government, could not be attended to as long as there was any portion of the mountains unprovided with at least a preliminary small-scale survey. This desideratum having now been attained, the Government has directed a large-scale survey to be made of the British districts of Jaunsār-Bāwar, Kangra, Kūlū, Spiti, &c., and operations have already been begun in Dehra Doon. We may hope to get much valuable and interesting information from these surveys, which are the first which have ever been undertaken in such lofty mountains on such a large scale.

Besides the various operations referred to above, others of a purely geodetical character have been in progress, by means of that native agency which the Trigonometrical Survey has always encouraged.

Exploration has thus been carried on in various directions by means of Asiatic explorers. A narrative and memorandum are given in the Report of an exploration of the Namcho or Tengrinoor Lake, drawn up by Lieut.-Colonel Montgomerie, R.E.; and some extracts are also furnished from the narrative, by another native explorer, of his journey through Western Nepaul from Pitoragurh, in Kumaon, viâ Jumla across the Himalayan ridge to Tadum, on the Sangpo or Upper Brahmaputra River, and then down through Nepaul along the Gundak River, and back to British territory.

Of these papers the first two, which are illustrated by a map, were prepared by Colonel Montgomerie, in England, from the original journals. They describe an exploration through an almost unknown portion of Great Tibet from Shigatze, across the Brahmaputra River, to the northern shores of the great Namcho Lake, the farthest point of which lies about 100 miles to the north of Lhasa. The above papers were briefly referred to at the last meeting of this Society. The exploration is especially remarkable as the first which has advanced to the north of the watershed of the Sangpo, or Brahmaputra, making some impression on the vast "terra incognita" of Central Tibet which lies between Lhasa and the desert of Gobi. Though the explorer was at a great height above the sea, generally over 15,000 feet, he met with numerous hot springs, somewhat like the Geysers, from which the water was ejected with great noise and violence to a height of 50 to 60 feet, and in falling was frozen so as to form what looked like artificial towers. At the farthest point reached, though about 400 miles north of the base of the Himalayas in Bengal, there were no signs of any diminution of the height of the mountains, the peaks near the Tengrinoor Lake being probably more than 25,000 feet above the sea. The ordinary heights still farther north in the district of Jamiátá Dè are most probably higher than those of the Tengrinoor, as that district is said to have a severer climate, and it is impossible to say how much farther north these lofty mountains, which may be presumed to be an eastern prolongation of the Kuen-lun, extend.

The Tengrinoor is a splendid sheet of water, 50 miles in length by 25 miles in breadth, and though over 15,000 feet above the sea, it is a favourite place of pilgrimage, and boasts of several monasteries, which are permanently occupied by Lamas, in spite of the climate, which is sufficiently severe in winter to convert the surface of this lake into a sheet of thick ice.

The third paper, which is also illustrated by a map, is a very useful contribution to our knowledge of the geography of the Nepaulese territories. By it the whole course of the Gundak River has been determined, this being the third great tributary of the Ganges, whose upper course has been surveyed by these Asiatic explorers within the last few years; for the Kurnáli and the Arun-Kosi, which form the upper courses of the Gugra and Kosi, were equally unknown as that of the Gunduk before the visit of the native surveyors. The rivers which come through Bhootān and the lower portion of the Sangpo are now the only drainage lines of which we are entirely ignorant, but already Colonel Montgomerie has told us that one of his explorers is penetrating even part of this "terra incognita."

In addition to the above, most extensive and valuable geographical explorations have been made during the last year in Kashgaria and the western portions of Eastern Turkistan, in the Pamir Steppes, and in the regions of the Upper Oxus.

Captain Trotter, R.E., of the Trigonometrical Survey, was selected by Colonel Walker, R.E., to accompany the mission to Yarkund and Kashgar; he was supplied with all the requisite instruments, and accompanied by four of the trained Pundit explorers. The result has been that considerable additions to and rectifications of the geography of Eastern Turkistan have been obtained, and Colonel Walker says that Captain Trotter may well be congratulated on the success with which his labours have been crowned.

To the north of Kashgar Captain Trotter carried a survey through the Artysh Valley up to the Russian frontier near the Chadyr-kul Lake, and has connected his work with that of the Russian geographers. He subsequently made a survey of a considerable portion of the road towards Ush-Turfān to the north-east, and reached the Belowti Pass, which is 150 miles from Kashgar, and only about 90 miles from Ush-Turfān. Captain Biddulph surveyed the road from Kashgar eastwards to Marálbáshi. But no further information was gained as to the Yarkund River, nor as to the long belt of unknown country at present ruled by the Amir of Kashgar (which latter probably extends 700 miles farther east than the points reached by Captains Trotter and Biddulph), nor of the road to the west leading into Khokan viâ the Terek Pass.

Captain Trotter afterwards made a route-survey from Yangi Hissar south of Kashgar to Sirikul, and then westwards viâ Aktash over the Little Pamir by the Mirza's Pamir-kul Lake, and ascertained that the said lake is one of the sources of a river which is here called the Aksu, and afterwards the Murghābi, and which joins the Oxus near Wāmar, being probably, as conjectured, the main source of the Oxus. Captain Trotter reached Kila Punja in due course, and from thence was able to send one of his native surveyors down the Punja River for a considerable distance, viz., to Kila Wāmar in Roshān. He was unfortunately unable to go farther down the river; but an exploration has since been made up the river from the Badakhshán road viâ Kolàb to a point near Kila Wāmar by Colonel Montgomerie's havildar, so that there is now but a very small portion of this great river remaining to be explored.

From Punja Captain Trotter returned *viâ* the Great Pamir to Aktash, and thence back to Yarkund by much the same route that he had advanced by.

While Captain Trotter was absent in Wakhán, one of the native explorers was sent from Yarkund by Sanju to Khotan with instructions to penetrate as far eastwards as possible. He traversed the ancient road to China as far as the Sorghāk gold-fields, and then returning to Keria crossed the Kuen-luen Range and the great table-lands of the higher Himalayas of Chinese Tibet, reaching the village of Noh, on the Pangkong Lake, 20 miles north of Rudok, and thence returned to Leh.

Captain Trotter has prepared a geographical memoir, which contains full details of the explorations made by the party, and which is likely to prove highly interesting; and it is hoped that the Society may before very long have a full account from Captain Trotter in person of what he and his companions have seen and done. I must also here refer to the examination made by Captain Biddulph, one of Captain Trotter's companions, of the passes leading from the valley of the Oxus across the hills to Chitral, Yassin, and Gilgit, a brief account of which I communicated in my November address. In a political point of view Captain Biddulph's survey was probably the most valuable result of Sir D. Forsyth's mission, and we are accordingly very anxious to learn details.

In cartography very great progress has been made in the Trigonometrical Survey Office; a new edition of the map of Turkistan has been actually issued, and a third edition is nearly ready, which will include all the later additions and corrections. Two more sheets of Colonel Montgomerie's Trans-Frontier maps have been also published, viz., Nos. 8 and 9, besides all the usual charts and maps that are annually executed. The Report is liberally illustrated, commencing with an admirably clear chart of the Great Triangulation of India, from which its present state can be gathered almost at a glance.

The Topographical Reports are each illustrated by index charts, from which every information likely to be wanted can be gained.

The Trans-Himalayan Exploration Reports are also illustrated by maps, which thoroughly explain where and what work has been done.

And, finally, an abstract is given of the monthly meteorological results, taken from the register kept at the office of the Superintendent Great Trigonometrical Survey of India, Dehra Doon;

and when it is stated that, in addition to the above, 9207 maps and 2027 charts were issued from the office, besides 3557 diagrams and 28,125 forms, it is easy to understand how very busy the members of the Great Trigonometrical Survey of India under Colonel Walker have been during the year.

This is not the place, perhaps, to enter on any elaborate notice of the public services of the officers of the Great Trigonometrical Survey of India; but, as the President of this great Society, I trust I may be permitted to say that the Geographers of England have always regarded the Department in question as the most valuable and efficient coadjutors which they possess in extending our geographical knowledge of the East. To Colonel Walker, who, as the head of the department, has issued the exhaustive Survey Report of the present year, and to his able assistant, Lieut.-Col. Montgomerie, who has enabled me, by his careful arrangement of the materials, to include the above summary of the Report in my present Address, the thanks of this Society are especially due; and we trust they will be long spared to pursue and carry through the honourable and important labours which have already occupied so many years of their brilliant professional career.

China.—In my Anniversary Address of 1873 I alluded to the extensive journeys in the interior of China that had been performed by Baron Richthofen, and to the important additions to our knowledge of the physical geography of that great Empire made by that accomplished savant. We now learn through a recent Bulletin of the French Geographical Society that a French savant, the Abbé Armand David, has also been occupied for a series of years in making journeys of similar extent through the various provinces of China and Mongolia, and in amassing information regarding the productions, climate, and people. M. David is a member of the Lazarist Mission at Pekin, and was sent there so far back as the year 1862; but having a strong taste for the natural sciences, he devoted much of his time in making zoological collections in various parts of Northern China and in Manchuria, so that in 1865 the authorities of the Jardin des Plantes obtained from the Superior of the Lazarists permission for the Abbé to devote himself entirely to this pursuit. Under the auspices of the Museum he afterwards, in 1866, penetrated to Sartchy and Barontaba-jao, in Mongolia, and in 1868–70 ascended the Yang-tsze to beyond the Chinese frontier. The observations of various kinds made during this and other long journeys have been published in the 'Archives du Muséum,' a publication more especially devoted to Zoology and Botany; but the geographical portions of the narrative are being extracted by M. Jules Gros, and published, as already mentioned, in the Bulletin of the French Geographical Society. A map of M. David's important journey in Mongolia, compiled by M. Hansen from data supplied by the traveller's journals, accompanies the first instalment of the work.

An interesting paper 'On the Inundations of the Yang-tsze-Kiang,' by Mr. E. L. Oxenham, of the Consular Service of China, has been communicated to us during the present Session, and will be published in our next 'Journal.' It forms a decided addition to our knowledge of the Physical Geography of China. The author, during a three years' residence at Hankow, had opportunities of observing that these wide-extending floods were of very different character as to colour of water, months of occurrence, &c.; and concluding that they could not all be attributed to the same source, he found on investigation that each kind of flood was derived from heavy rainfalls or the melting of snow near the upper part of a separate river-basin, though all the basins debouch in the valley of the Yang-tsze. Mr. Oxenham discusses the subject with much ability; and we must all hope that he will continue his observations on this and kindred subjects, now that he has returned to China to resume his diplomatic duties.

AUSTRALIA.—Last year our chief topic in regard to Australian Exploration was the remarkable journey of Colonel Egerton Warburton across the interior of the western portion of the continent, for which feat we awarded him our Gold Medal. Since then we have had the gallant officer among us, and heard an account of his expedition from his own lips. At the time when news arrived in the capital of Western Australia of the long-delayed arrival of Warburton at a point within hail of the coast settlements, a still more remarkable traverse of the same desert, blank region was preparing. This was the expedition of our Associate, Mr. John Forrest, who had previously distinguished himself by the skill and success with which he had carried out numerous surveys over vast expanses of country which had defeated the efforts of many previous explorers. Mr. Forrest's expedition started from Champion Bay, on the west coast, on the 1st of April, 1874, and crossing the unexplored region at a part where it is much broader than where traversed by Warburton, reached the Peake

Station on the line of Overland Telegraph on the 30th September. The expedition was planned and suggested by Mr. Forrest himself in a letter to the Governor of Western Australia, written in July 1872; and the project then being approved, it was laid before the Legislative Council, who voted 400*l.* towards the expenses. It was not till after this that the three expeditions from South Australia (viz., those of Warburton, Gosse, and Giles) left the Telegraph Line on their march westward. As stated in his letter of instructions, the chief object of Mr. Forrest's expedition was to obtain information concerning the immense tract of country from which flow the Murchison, Gascoigne, Ashburton, De Grey, Fitzroy, and other rivers falling into the sea on the western and northern shores of the Western Australian colony, as there were reasonable grounds for believing that those rivers flowed from districts neither barren nor badly watered. The line of country to be traversed, therefore, lay far to the south of the route of Colonel Warburton. The party, consisting of Mr. Forrest and his brother (Mr. Alexander Forrest), two other Europeans, and two natives, had not the advantage of camels with which the successful South Australian Expedition had been supplied through the enterprise of its supporters, Messrs. Elder and Hughes. They took with them twenty horses, and a supply of provisions for eight months. The expectations that were formed in the colony of the discovery of fertile tracts of country beyond the head of the Murchison River were not fulfilled; but arid and desolate regions, over which the party under its skilful leader was safely led, were found stretching 600 miles from that point as far as the eastern boundary of the colony on the 129th meridian. Mr. Forrest reports of this vast area, that he thinks it will never be settled by colonists; its general character is that of a gently undulating desert, clothed with that plant of evil augury to Australian settlers, the spinifex grass. It is not, however, wholly destitute of other vegetation, being lightly wooded with acacia and other small trees, and having even some larger timber in a few of the creeks. Natives were numerous even in the worst parts of the region, and they attacked the party three times. Fifteen out of the twenty horses survived the passage of the desert, but only three of them had sufficient strength left to carry a man, and the members of the party had to walk in turns the whole way, a distance of 2000 miles. A full report of Mr. Forrest's journey has recently been presented to the Society, and will be published, together with a reduction of the magnificent map of the route, in our next year's Journal. As geographers, we cannot speak too highly of the scientific completeness of the information supplied to us by this report and map; for not only was the entire route accurately surveyed, but copious notes were made of the geology and natural history of the country. Mr. Forrest, whom we all rejoice to see in person amongst us on the present occasion, has well-earned his place in the very foremost rank of Australian explorers.

A shorter journey, made about the same time as that of Mr. Forrest into the same desert interior, deserves a few words of mention, inasmuch as it diverged into a more southerly latitude than any of those which preceded it. I allude to the expedition of Mr. John Ross, of South Australia, which was equipped by Messrs. Elder and Hughes, originally with the intention of proceeding in search of Colonel Warburton, but, on news arriving of his safety, was directed to try a south-westerly course into the unexplored area from the line of the Overland Telegraph. Mr. Ross left the Peake Station about the 20th of March, 1874, and after a few days' march, fell in with dense thickets of mulga (a kind of acacia) which appeared of boundless extent, and was quite impenetrable by camels. He reached s. lat. 30° 25′, and E. long. 131° 16′, whence he was compelled to retrace his steps to the Telegraph Line.

The persevering traveller Giles, who was equipped by public subscription in Melbourne (chiefly promoted by Baron von Müller, the celebrated botanist), and was the first to traverse a considerable extent of the western interior from the Line of Telegraph, has since made a second long journey westward. Like Forrest, he was unprovided with camels, but he succeeded in reaching the 125th meridian, at which point he was forced to return back by the death of one of his companions, who lost his way and perished in the desert. Mr. Giles' aim was to reach the watershed of the Murchison, Gascoigne, and Ashburton rivers, from the eastern slopes of which his advisers, like the West Australian authorities, vainly thought a well-watered country might be found.*

New Guinea.—In the earlier part of this Address a detailed account of the second visit of Captain Moresby to New Guinea is given, as part of the Report of Naval Survey operations of the year, furnished by the Admiralty Hydrographer. You have heard, also, during the Session, a graphic description of the same visit from the lips of Captain Moresby himself; it is unnecessary, therefore, for me to repeat the incidents in this place. The discoveries of Moresby are likely to prove a turning-point in the destinies of New Guinea, for they have given rise to movements, both in this country and in Australia, in favour of extending British authority over portions of the island, which will probably not end until their aim is attained. Meantime our geographical knowledge of the country is increasing but slowly. Since Moresby's voyage we hear only of a visit made by Mr. MacFarlane, of the Missionary party mentioned in the Address of my predecessor, to Port Moresby, on the south coast, which he described as a magnificent harbour, but surrounded by a stony and barren country which would render it unavailable for settlement. Yule Island has been found more suitable for a Mission station than Port Moresby. The Russian traveller, M. N. Mikluko-Maclay, who since his Papuan journey has been exploring the unfrequented interior of Malacca, has, I am happy to announce, written for us an account of some portion of his travels in New Guinea, which has been translated and brought home by Colonel the Hon. William Feilding. Signor D'Albertis, the Italian naturalist, has been heard of as having reached Cape York on his way to New Guinea.

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* A later telegram announces that Mr. Giles has succeeded in reaching Strangways Springs on the Telegraph Line (lat. 29° s.) from Fowler's Bay on *the great Australian Bight*. He had passed over "a stretch of 220 miles without *obtaining a drop of water.*"

NORTH AMERICA.—The most important contribution to the geography of North America which has come to our knowledge during the past year is contained in Professor Hayden's Report of the United States Geological and Geographical Survey of the Territories for 1873, which was published by the Washington Government in the latter part of 1874. This exhaustive account of the year's survey operations forms an octavo volume of 700 pages of close print, copiously illustrated with views, sections, and maps; besides a number of exquisite photographs of scenery mounted separately. The Survey under Professor Hayden had been for the two previous years occupied with the mountainous country around the sources of the Missouri and Yellowstone rivers, regarding which some details were given in my Addresses of 1872 and 1873; but the operations have been since transferred to the eastern portion of the Rocky Mountain range in Colorado and New Mexico, to which the Report now before us relates. The area to be surveyed was separated into three districts, and a separate party, completely equipped, despatched to each: the result has been the accumulation of a vast amount of new information in the various branches of science. The purely topographical part of the Report forms only about one-eighth of the volume; but the officers in charge of that Department have issued, separately, a Map of part of Colorado. The horizontal measurements of the Survey were made by a connected triangulation developed from a measured base near Denver. A large number of tables of altitudes of peaks, towns, and remarkable points in the Rocky Mountains is given in this portion of the volume.

Madagascar.—One of the most original and interesting papers read before us during the Session now drawing to a close, was that of Dr. Mullens, in January last, 'On the Central Provinces of Madagascar.' This gentleman, the Foreign Secretary of the London Missionary Society, during a brief visit of only a year to the island, contrived, by making an intelligent use of his opportunities of observation, to bring back a surprising amount of new information regarding the topography, physical geography, geology, and ethnology of this wonderful island. The relative positions of all the prominent physical features as well as of the chief towns were ascertained by him and another member of the Mission with great care and evident accuracy, and depicted on maps which did credit to Dr. Mullens' skill in cartography. We now know how limited our knowledge had previously been of the interior of Madagascar, for, with the exception of the rough map published by Grandidier, the French traveller and naturalist, about four years ago, all attempts to portray the interior geography of the island have been mere guess-work. Dr. Mullens has had opportunities of surveying large portions of the island unvisited by Grandidier, and of correcting and supplementing his information regarding many parts visited by both. Some of the main features of the island were graphically described by Dr. Mullens in the paper to which I refer, especially the successive terrace-like ascents by which the plateau-land of the interior is reached from the coast; the singular way in which the fertility of the rich plateaux is due to the natural dams of basaltic rock which keep back the drainage of the rivers, and so forth. As the paper will be published entire, with the map, in the next volume of our Journal, I need not enter here into further detail; but I will not quit the subject before mentioning that other members of the Missionary body, which Dr. Mullens so worthily represents, are now engaged on the spot in adding to our knowledge of the geography of Madagascar, and that we may hope hereafter to receive further contributions of similar character.

SOUTH AMERICA.—The Republic of Chili has always been honourably distinguished by the attention paid by its successive Governments to the scientific requirements of the nation. In former Addresses mention has been made from time to time of the progress of the official surveys of that country, and of the excellent maps which have been issued by the Department. A further step has now been made by the commencement of an annual publication, issued by the Hydrographic Office of Santiago, the first volume of which has just reached us. This important work is occupied chiefly with the Reports and Maps of the Naval Surveyors who are occupied in exploring the almost endless fjords and channels which diversify the southern coast of Chili, from Valparaiso to the Straits of Magellan. Under the direction of the present Head of the Department, Captain Vidal Gormaz, himself an accomplished geographer, this volume is sure to furnish, from year to year, a rich store of information. The first volume, published at the commencement of the present year, contains nearly 500 large octavo pages, 360 of which are devoted to Reports of original exploration: it is illustrated by twelve well-executed maps, drawn and engraved in Chili, two of which relate to rivers and passes over the Andes, the operations of the Surveys not being confined to the coast-line, but extending also to the interior, where the country required exploration. In a region which has been so much explored by our own Naval Surveyors, and which is becoming yearly of more commercial importance, through the increased use of the sheltered channels conducting northwards out of the Straits of Magellan, these Chilian surveys cannot fail of attracting the notice of Geographers, besides proving of much practical utility.

An excellent general map of the provinces belonging to the Argentine Confederation has recently been published in Petermann's 'Mittheilungen,' under the direction and according to the materials supplied by our Associate, Major F. J. Rickard, who was long resident in those countries, and has well availed himself of the unusual opportunities he enjoyed of accumulating Geographical information. In other parts of South America we do not hear of much geographical progress. The Hydrographic Commission for the Exploration of the Peruvian Amazons had terminated its labours for the present, and Captain Tucker, the chief of the Commission, proceeded in May last to Washington for the purpose of working out the results and preparing the maps that will, it is hoped, do justice to the importance of the subject. Mr. Keith Johnston, I may add in conclusion, has just returned from his scientific mission to Paraguay, during which he has made two journeys of exploration on his own account, the results of which, it is hoped, he will communicate to this Society.

AFRICA.—The continent of Africa still continues to attract a large share of the attention of the public, presenting as it does an inexhaustible field for geographical enquiry, and being also closely connected with those large questions of civilization and progress which powerfully appeal to the sympathies of thoughtful men, and thus excite universal interest. The appearance of 'Livingstone's Last Journals,' which in my Address of November last I announced to be on the eve of publication, has since created a profound impression. On one side it has aroused the friends of humanity to fresh exertions for the suppression of the slave trade, and has thus led them to assist or set on foot various exploratory expeditions into the interior of Africa, which I shall notice presently. On the other side, geographers have acknowledged with gratitude the large accessions to their knowledge supplied by the Map which the Rev. Horace Waller, Livingstone's indefatigable and conscientious Editor, has compiled from the great traveller's journals and note-books. The route from the sea-coast to Lake Nyassa, laid down in the first instance from rough entries in the 'Journal,' has been since verified by the recovery of a Map, in Livingstone's handwriting, which was found by Cameron at Ujiji. The contour of the southern portion of the lake is also a good deal altered from what was previously known; while if we compare the great valley of the Lualaba from the mountains to the Equator, as conjecturally sketched in former years by Keith Johnston, Ravenstein, and Stanley, with the elaborate Map now copied from Livingstone's drawings, and partially corrected by his observations, we shall become sensible of the great improvement already acquired in our knowledge of this part of Africa. At the same time, with characteristic and most commendable caution, Livingstone left special instructions that no positions gathered from his observations of latitude and longitude should be considered to be determinately fixed until his friend Sir Thomas Maclear, Astronomer at the Cape, had duly examined them; and it is thus possible that when Sir Thomas's Report shall be received, some alterations may still require to be made in future editions of the Map.

In connection with Livingstone's journeys along the Lualaba, which, although not, as he believed, relating to the Nile, will still always remain one of the proudest memorials of African discovery, the proceedings of Lieutenant Cameron are of the greatest interest and importance. It may be remembered that at the last Anniversary Meeting Lieutenant Cameron was reported to be at Ujiji, whither he had proceeded in order to rescue the remainder of the Livingstone papers; and that our late President, Sir Bartle Frere, relying on his friend's determined character, predicted that, if he preserved his health, he would still achieve distinction in the exploration of the lake regions. This prediction has been since amply verified; Lieutenant Cameron having not only made a full examination of the southern shores of Lake Tanganyika, and having sent home a Map of the lake, which has been published in our 'Proceedings,' and is one of the most complete bits of African Survey upon record, but having also discovered a river on the western shore, which he believes to be the long-sought outlet of the lake, and along which he has accordingly determined to travel in the hopes of tracing its source to the Lualaba, and being thus able to descend by that stream, presumed to be the same as the Congo, to the western sea-coast of Africa. Lieutenant Cameron left Ujiji on his perilous errand about this time last year, and nothing has been since heard of him, though, according to the distances reported by the natives, he did not expect to consume more than six months on his journey. It was his intention to follow Livingstone's track through Manyema as far as Nyangwé, in 4° 5′ s. latitude, and from that point to push boldly on into an unknown region, verifying, in the first place, the native reports of a vast equatorial lake, and determining afterwards whether the Congo or the Ogowé, or both of these rivers, drained off the waters of the lake to the sea. There is no concealing the fact that this projected journey of Lieutenant Cameron's, on which he has entered with little preparation, impelled by an ardent desire for geographical discovery, is one of extreme danger. If he should indeed succeed, single-handed as he is, in crossing the African continent from the forests of Manyema to the mouth of the Congo, through a country unknown and beset with wild and hostile tribes, he will have achieved a feat unparalleled in the annals of geographical discovery, and will take his place in the very first rank of African explorers. In the mean time the Royal Geographical Society has opened a subscription, with a view of providing the necessary funds for his adventurous journey, and has headed the list with a donation of 500*l*.

While discussing the Congo, it may be convenient to state that Lieutenant Grandy, whose return to England was announced in my November Address, has since submitted to the Society a full Report on the Livingstone Congo Expedition, which has been duly published in our 'Proceedings.' Lieutenant Grandy's experience is not favourable to renewed exploration in this quarter. He found the native tribes of the interior intensely jealous on the subject of European exploration, believing that the object of all so-called travellers was, firstly, to appropriate the mineral resources of the country, and, secondly, to transfer to their own hands the carrying-trade between the Upper country and the sea-coast; and he thus augured unfavourably for the success, in penetrating the interior, of the German Expedition, which has hitherto been usefully employed in minor investigations between the Congo and the Ogowé. The latter river, falling into the sea a little south of the Gaboon, was first rendered familiar by the travels of Du Chaillu, who, however, saw only its lower course. It has since been traced a long distance in the interior, first by our Associate, Mr. R. B. N. Walker, in 1866, and afterwards, in 1874, by a French party under the Marquis de Compiègne, who reached a point 300 miles above its mouth. It is now about to be subjected to a still more extensive and elaborate investigation. This expedition, indeed, which has been organized by Messrs. de Brazza and Marche (one of the Marquis de Compiègne's party) on a scale of extraordinary magnitude and completeness, and which has been further assisted and supported by the French Government, is announced to leave Paris in September, with the avowed object of ascending the Ogowé, and crossing the interior of Africa to the basin of the White Nile, the preparations being on such a scale that the travellers will be able, it is said, if necessary, to overcome the opposition of the native tribes and thus prosecute their journey by force of arms across the whole breadth of the continent. We hear that Herr Lenz, the Geologist, is on his way also to the Ogowé, with the intention of striking across and joining the main body of the German Expedition, on the march which it is about to undertake from some point near the Congo, into the interior.

At a more northern point of the Western Coast of Africa a project is also on foot which, although hardly as yet sufficiently matured to claim the attention of geographers, may possibly in the future exercise a very important influence on the moral and physical condition of the continent. The project is simply to cut a canal through a ridge of high ground near Cape Bojador, and thus allow the Atlantic to flood the great basin of the Western Sahara, changing this vast desert into an inland sea. Until it has been determined by careful measurement that the present level of the Sahara is below that of the ocean, and that the hills through which the River Belta now flows westward to the sea can be cut through or tunnelled, so as to admit the inflow of the Atlantic in an opposite direction, it is hardly worth while to consider, from a scientific point of view, the effects that would be produced by such an important change in the physical features of Northern Africa; but there can be no doubt of the great benefits that would accrue to civilization and commerce if a waterway could be thus opened for many hundred miles into the interior of the continent.

The spirit of geographical enterprise is being developed in Eastern Africa with not less activity than on the Western Coast. The indefatigable Mr. Stanley has been sent by his English and American patrons to explore the lake regions at the head of the basin of the Nile, and is believed to be now examining the country between the Victoria Nyanza and the hill-ranges to the eastward. Owing to the withdrawal of the Zanzibar Sultan's authority over Unyanyembé, and the consequent interruption of all communication between the interior and the sea-coast, nothing has been heard of Mr. Stanley since last autumn; but we may rely with confidence on his indomitable energy, and his singular aptitude for African travel, to solve the question, which still remains undecided, as to the Victoria Nyanza being a single lake or a series of independent lagoons. The Victoria Nyanza has been also visited during the past year by Colonel Long, who was despatched on a mission to M'tesa, King of Uganda, by Colonel Gordon, the able Commander of the Khedive's forces on the Upper Nile. A letter from Colonel Long on the subject of his journey has been published in our 'Proceedings;' and although his account of the geography of his route is somewhat difficult to unravel, so much, at any rate, can be made out, that he made an excursion on the Victoria Nyanza, and embarked on what he believed to be its outlet at Urondogani, and sailed down it to Foweira, near the Karuma Falls, discovering on his way a considerable lake, through which the river passes, in about 1° 30′ N. A map of Colonel Long's route, drawn up from his notes in the "Bureau de l'Etat Major," at Cairo, has been recently presented to the Society through Sir Bartle Frere, It appears that the new lake has been named after Ibrahim Pacha.

Colonel Gordon's own operations have been hitherto greatly impeded by the sickness of his subordinates, as well as by the difficulty of procuring means of transport. He was joined at Gondokoro by the young engineer officers, Lieutenant Watson and Chippendale in last November, and at once began to make preparations for navigating the Albert Nyanza, but, as far as we know, up to the present date, no great progress has been made in attaining that object. A preliminary survey has, it is true, been accomplished by Mr. Kemp of 130 miles of the Nile from Regiaf, south of Gondokoro, to Duflé, the river during the whole of this interval being so broken up by rapids and cataracts as to be entirely unnavigable, and arrangements have been made for transporting by hand from Gondokoro the sections of a steel boat to be put together at this upper station, from whence the passage to the lake is believed to be perfectly open; but in order to move the boilers and machinery of the steamer, far more effective means of transport are required,[*] and there is no immediate prospect of such means being procurable. In the mean time Lieutenant Watson has been obliged to return to England invalided, bringing with him, however, a detailed and very excellent Survey of the Nile from Khartoum to Gondokoro, and Lieutenant Chippendale is therefore left to pursue his engineering labours single-handed.[†]

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[*] I am happy to be able to announce that, since this was written, the Government of India has decided to present the Khedive with six well-trained and fully-equipped elephants, to be used with Colonel Gordon's Expedition, in acknowledgment of the many services rendered by his Highness to the British Government. The elephants will be landed at Suakim, whence they will proceed to Khartoum, and so on to Gondokoro.

[†] Lieutenant Watson, since his arrival in England has furnished us with the following abstract of Colonel Gordon's recent proceedings, which will be perused with interest:—

"As the Geographical Society has already been informed, Lieutenants Watson and Chippendale, R.E., and M. Linant reached Riga at the end of last November; the two former with orders to proceed to the Albert Nyanza, and the latter to Fatiko, so soon as a sufficient number of porters could be obtained. None, however, could be procured until the middle of January, when M. Linant succeeded in obtaining the services of some Bari men, and started for Fatiko, intending afterwards to go on to Foweira, a Government station on the Victoria Nile, and to follow the course of that river to Uganda, on the Victoria Nyanza.

"About the same time an ivory-caravan, commanded by Mohammed Wat-el-Mek, arrived at Gondokoro from Fatiko, and, on the 28th of January, Lieutenant Chippendale, accompanied by Wat-el-Mek and about 400 bearers, started from Regiaf for Duflé, taking with him a quantity of stores and parts of the small screw steamer, which it is intended to place on the Albert Nyanza. Lieutenant Watson

Auxiliaries to Colonel Gordon are, however, preparing for work in many quarters. An Austrian subject, of the name of Marno, who has already some experience on the Upper Nile, is desirous of exploring the mountains to the west of the Albert Nyanza, and is understood to have already started in that direction from Gondokoro; while other exploring parties attached to the Khedive's forces in the Darfúr occupation have been directed by his Highness to examine the country to the south-west of that province, and application has been duly made to permit the Europeans employed upon the duty to communicate the results of their examination to this Society.

In my November Address I alluded to the successful journey of Dr. Nachtigal in the Eastern Sahara, but we had not then received any details of his explorations. The accounts, however, which have since reached us show that the Doctor is entitled to the highest rank among African travellers. He is the first European who has ever penetrated the eastern half of the Sahara in his perilous journeys to Tibesti. He has elucidated the hydrography of Lake Chad, having traced the water to an ancient bed now in the midst of the desert. He has further explored Wadai as far as the territories of the independent negroes to the south; and finally, he has crossed from Lake Chad through Darzaleh and Darfúr to the Nile basin, thus succeeding in an attempt which cost Vogel and

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did not accompany him, having been ordered to return to Lardo in consequence of ill health.

"Means of transit not being readily obtainable for the heavier pieces of the steamer, Colonel Gordon ordered Lieutenant Chippendale not to wait for them; but, on reaching Duflé, to march for the Lake, and there to obtain canoes from the natives, and to return to Duflé by the river, in order to ascertain by actual observation whether it was navigable for the steamer. Lieutenant Chippendale decided to travel by the west bank, as two Madi chiefs, who had come down with Wat-el-Mek's party, said that the Roshi tribe, who live on the west side of the hill between Duflé and the Lake, were friendly and possessed large canoes. No intelligence has been received from either Lieutenant Chippendale or M. Linant since their departure from Regiaf.

"At the end of January Colonel Gordon left Lardo, the present head-quarters station, which is a few miles north of Gondokoro, and proceeded by steamer to the River Saubat, stopping at Rabat-Shambé, the Government station among the Kytch tribe. On account of the unhealthiness of the place, and the consequent mortality among the troops, Colonel Gordon ordered it to be evacuated and the garrison to march to a point about six days' journey to the westward, and there to form a new station.

"After inspecting the stations on the River Saubat, Colonel Gordon returned to Lardo, where he arrived on the 4th March. He then proceeded to Regiaf to make arrangements for bringing up the remainder of the steamer to Duflé; and on the 17th March, the date of the last letter which has been received from him, he was just about to start for the south, hoping that before very long he would get the steamer completed and ready to navigate the Lake Albert Nyanza."

Beurmann their lives. Dr. Nachtigal has been for some time past residing at a sulphur bath at Helwan, in Upper Egypt, recruiting his health and preparing a narrative of his travels, the publication of which is looked for by all geographers with intense interest.*

It is further of importance to notice the forthcoming Italian Expedition to Eastern Africa under the Marchese Antinori. The area to be examined by this Expedition is that included between Southern Abyssinia, the Victoria Nyanza, and the line of the White Nile. The party will proceed in the first instance to the Court of the King of Shoa at Ancobar; from thence they will pass through the Galla country to Bonga, being assisted in this part of their exploration by an Italian Missionary Bishop who has resided for 30 years in Southern Abyssinia, and possesses the greatest influence over the Galla tribes. In their explorations beyond Bonga they will be guided by circumstances; but they hope to be able to connect this position with the Nile above Gondokoro, and thus complete our knowledge of this portion of North-Eastern Africa. The funds required for the expedition amounting, as it is estimated, to 4000*l.*, are being raised by private subscription, and it is gratifying to find that English aid has been liberally promised. We shall naturally follow the steps of our fellow-geographers, in the perilous and almost unknown region which they are about to penetrate, with the liveliest interest, and cordially wish them success.

With not less interest shall we regard an expedition which has just left England for the shores of Lake Nyassa, *viâ* the Zambesi and the Shiré, which although not Geographical in its chief aims, cannot fail, if it succeeds in its main object, to add much to our Geographical knowledge. I allude to the missionary party under the guidance of Mr. Edward Young, the same skilful leader who so successfully conducted our Livingstone boat-search to Nyassa in 1867. The Mission had its origin in Scotland, equally supported by the Free and Reformed Presbyterian Churches, and is planned and managed by a Committee with Dr. Stewart at its head. Their object is to found a Mission Station, to be named Livingstonia, for the industrial and educational as well as religious instruction of the swarming population of that region, on Maclear Promontory at the southern end of the Lake. We hear that no less than

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* Dr. Nachtigal, since this Address was delivered, has arrived at Berlin, and been received with great enthusiasm by the German Geographical Society, at a *Special Meeting on the* 2nd June.

16,000*l.* have been already subscribed in Scotland towards the expenses of this great undertaking. Mr. Young, who has accepted a set of astronomical and surveying instruments from us, intends to complete the survey of the Lake by circumnavigating its northern part, and has the ready consent of the Mission Committee to communicate his report of the survey to our Society.*

Among the other African subjects which have been brought under our notice during the past year are—1. A journey by Captain Elton on the Eastern Coast south of Zanzibar from Dar-es-Salam to Kilwa, which is of much importance for the light which it throws on the present state of the African slave trade; 2ndly. Mr. St. Vincent Erskine's account of his journey to the Court of Umzila, King of Gosa, who rules from King George's River to the Zambesi, also of particular interest in connection with the African gold-fields and the pending arbitration of our disputes with Portugal regarding the frontier in Delagoa Bay; and 3rdly. The Rev. Mr. New's description of his visit to Usambara, which, although of no particular geographical value, possesses a melancholy interest as the last production of this earnest and most efficient missionary traveller from whom so much was expected in the future exploration of Africa.

Conclusion.—And now, Gentlemen, having rapidly sketched the present state and prospects of Geography in the various quarters of the globe, as far as they are at present known to me, I venture to offer a few general remarks on the view and objects of our own Society. I am hardly prepared to accept in its entirety the pleasing doctrine of Sir Bartle Frere, that our own prosperity is a gauge of the prosperity of the nation; but I am prepared to show that, according as we labour more or less actively in our vocation, so do we contribute, in a greater or less degree, to the fulfilment of the national wants and the advancement of the national interests. In encouraging the early study of Geography, in fostering merit by honorary reward, in assisting travellers, in supporting expeditions, we do not merely aim at the accumulation of dry details of Geographical science, but there are always practical views of sound public benefit underlying our efforts. Exploration indeed is the pioneer of progress. Travels in unknown regions lead to the introduction of civilisation, the spread of commerce, the friendly intercourse of man with man. Among recent important works, tending to improve the condition of mankind, which owe their origin more or less directly to Geographical enterprise, we may point to the establishment of telegraphic communication across the continent of Australia; to the serious efforts being now made for the suppression of the West African slave-trade, which are the direct results of Livingstone's travels in Equatorial Africa; to the extension of trade in Central Asia; the colonisation of Southern Africa; the opening out of lines of railway communication generally throughout the world. Even in the Arctic Expedition, which is about to leave our shores, the high objects of national honour and professional efficiency have been as much considered by us as the acquisition of technical geographical knowledge. And it is, I believe, owing to this conviction that we are not a dilettante Society, formed for mere amusement, nor yet a learned body occupied exclusively with abstract science, but that we strive to utilise knowledge and to combine the practical and scientific—it is owing to this conviction, I say, on the part of the public that we owe much of our popularity and much of our power. At any rate there can be no question but that we do stand very high in public favour. The crowded state of our meetings, the continued influx of new members, the deference which is shown by the Government to our recommendations and appeals, the gracious acceptance by H.R.H. the Duke of Edinburgh of the post of Honorary President, are all so many indications of public confidence and so many incentives to sustained exertion in the laborious but honourable path which lies before us.

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* I ought to mention here that within the past few days the silver medals designed by Mr. A. B. Wyon, which the Council ordered to be struck for presentation to all the followers of Livingstone who were with him at his death, have been despatched to the British Political Resident at Zanzibar for distribution to the men. The medals are sixty in number, and on the rim of each is engraved the name of the recipient, with the words "Faithful to the end." The obverse of the medal presents an excellent portrait of Livingstone, with the legend "David Livingstone, born 1813, died, Ilala, 1873; and the reverse, "Presented by the Royal Geographical Society of London, 1874."

Desiring earnestly the prosperity of the Society, and prepared to devote whatever time and abilities I can command to the furtherance of your interests, I have cheerfully accepted the responsibility which has been imposed on me by the Council, and which you have since confirmed by your vote, of continuing for another year to direct your affairs as President. Having served a noviciate of many years under Sir Roderick Murchison, and having observed the nice judgment, the sound sense, and knowledge of the world, which he brought to bear in regulating the business of the Society, I have usually been able, whenever any difficult question arose, to steer my way successfully by considering what he would have done in similar circumstances; and I have further had the long experience and tried discretion of our Council and permanent Staff to fall back on, if my recollection of Sir Roderick's example failed me. I rely with confidence on such infallible guides in the future as in the past, and with this tribute to the memory of one who has been justly called the Father of the Royal Geographical Society, I now take my leave of you, merely asking you, in conclusion, to remember the deep obligation that we owe to the Senate of the University of London for our continued meetings in their noble Hall, and to join with me in expressing our cordial acknowledgments for the most important aid which is thus afforded us.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[Published August 10th, 1875.]

SESSION 1874-5.

Fourteenth Meeting, 14th June, 1875.

Major-General Sir HENRY C. RAWLINSON, K.C.B., President, in the Chair.

Elections.—*Antonius Ameuney, Esq.; Andrew Buchanan, Esq.,* M.D.; *John Ferguson, Esq.,* J.P.; *Rev. Herbert Kynaston,* M.A.; *Luke S. Leake, Esq.; James Macdonald, Esq.; Alfred John Pound, Esq.*

Presentations.—*Allan Wyon, Esq.; Alfred B. Wyon, Esq.; L. A. Lucas, Esq.; Thomas Kincaid, Esq.*

Donations to the Library, April 26th to June 14th, 1875.—Selections from the Records of the Bombay Government, No. CXLV., new series; Selections from the Records of the Madras Government, No. XLIV.; Selections from Records of the Government of India, No. CIV.; General Report on the operations of the Great Trigonometrical Survey of India during 1873–74, and Synopsis of the results of the same Survey, vol. ii., by Col. J. T. Walker, 1874; Report on Census of Madras Presidency, 1871, vols. i. and ii.; and Census of Bombay Presidency, 1872, parts 1 and 2 (*H.M. Secretary of State for India*). Memoirs of the Geological Survey of India, vol. x. pt. 2, and vol. xi. pt. 1; Records of the same Survey, vol. vii. pts. 1—4; Palæontologia Indica, vol. i. 1, ser. x. 1 (*The Office of the Geological Survey*). A Narrative of the recent events in Tongking; by H. Cordier, 1875 (*Author*). Ergebnisse der Beobachtungsstationen an der deutschen Küsten über die physikalischen Eigenschaften der Ostsee und Nordsee und die Fischerei, vi. and *vii., 1875 (The Commission*). Handleiding tot het statistisch Onderzoek; by S. Vissering, 1875 (*Author*). Die meteorologischen Beobachtungen und die Analyse des Schiffcurses während der Polarexpedition unter Weyprecht und Payer, 1872–1874; by B. von Wüllerstorf-Urbair, 1875 (*Author*). Procès-verbal des Séances de la Commission Géodésique Suisse, 1874 (*Dr. Ziegler*). Victorian Year-book for 1873; by H. H. Hayter, 1874 (*Author*). Journal of Proceedings of the Western Australian Exploring Expedition from Champion Bay to the Overland Telegraph Line, commanded by John Forrest, 1875 (*J. Forrest, Esq.*). Steppe Campaigns, translated from the Russian; by Capt. F. C. H. Clarke, 1874 (*Topographical Branch, Q.M.G.'s Department*). The East India Company; by W. Fidler, with additions, &c., by G. M. Craufurd, 1875 (*G. M. Craufurd, Esq.*). Ninth Annual Report of Colonial Museum and Laboratory, New Zealand (*Dr. Hector*). La Végétation du Globe; translated from the German of A. Grisebach by P. de Tchihatchef, vol. i. pt. 1, 1875 (*M. de Tchihatchef*). Yacht-Reise in den Syrten, 1874; and Einige Worte über die Kaymenen, 1875 (*Anon.*). Lahore to Yārkand; by G. Henderson and A. O. Hume, 1873 (*E. Bibby, Esq.*). Vorläufiger Bericht über eine Reise im südwestlichen Kleinasien; by Dr. G. Hirschfeld, 1874 and 1875 (*Author*). Viagens, Hespanha e França, 1874; and, França, Baviera, Austria e Italia, 1875; by Luciano Cordeiro (*Author*). Census of Victoria, 1871, pts. 1—9 (B) (*H.M. Secretary of State for Colonies*). Relics of the Great Auk; by John Milne, 1875 (*Author*). Saskatchewan and the Rocky Mountains; by the Earl of Southesk, 1875 (*Author*). Miniature Models of the Aztec Sacrificial and Calendar Stones; and, Apuntes para un Catálogo razonado de las palabras Mexicanas introducidas al Castellano; by Eufemio Mendoza, 1872 (*C. H. Wallroth, Esq.*). Eight bound 8vo. volumes of pamphlets, newspaper cuttings, &c., with reference to the search for Sir John Franklin, and Expedition to the Arctic Regions in search of Franklin (*John Barrow, Esq.*). Catalogue of the London Library, 4th edition (*The Committee*). Topography and Physical Resources of the State of New York; by Egbert L. Viele, 1875 (*Author*). Die Kreide-Flora der Arctischen Zone; and, Nachträge zur Miocenen Flora Grönlands; by Oswald Heer, 1874 (*Dr. E. A. Nordenskiöld*). Two Photographs of Sir John Hawkins (*Rev. B. D. Hawkins*). Hydrographic Proceedings; H.M.S. *Challenger*, No. 3 (*Lords Commissioners of the Admiralty*). Department of the Interior, U. S. Geological and Geographical Survey of the Territories, Bulletin, 2nd series, Nos. 1 and 3; Report of Survey embracing Colorado, 1874; Geological Survey, 25 photographic views; Miscellaneous publications, Nos. 1 and 6; Catalogue of the Survey publications; and Report, No. 612, of Geographical and Geological Surveys west of the Mississippi (*Dr. F. V. Hayden*). Meteorological Observations made at Windsor, New South Wales; by John Tebbutt, 1874 (*J. Tebbutt, Esq.*). Sul Giacimento di Carbon fossile antracito di Demonte; by G. Jervis, 1875 (*Author*). Ueber die Naturgesetze der äusseren Formen der Unebenheiten der Erdoberfläche; by Ritter von Hauslab, 1874 (*Author*). Registrande der geographisch-statistischen Abtheilung des Grossen Generalstabes, Fünfter Jahrgang, 1875 (*The R. General Staff Office*). Modern Jerusalem; by the late C. F. Tyrwhitt Drake, 1875 (*Rev. Mr. Drake*). Reliquiæ Aquitanicæ, part xvi. (*Executors of the late H. Christy, Esq.*). Il Viaggio di Giovanni Miani al Monbutto, 1875 (*The Italian Geographical Society*). Bibliothèque de Linguistique et d'Ethnographie Américaines, vol. i., 1875; Voyages à la Côte nord-ouest de l'Amérique, vol. i. pt. 1, 1875; La Caverne d'Aknañh, Ile d'Ounga, 1875; Sur les Atnahs, 1875; Notes sur les Koloches, 1873; Voyage à la Côte nord-ouest d'Amérique d'Ounalashka à Kadiak, 1874; La Chasse aux animaux marins, nord-ouest d'Amérique, 1875; Eskimaux et Koloches, 1873; Les Aléoutes et leur origine, 1872; and Catalogue des collections rapportées de l'Amérique Russe, 1872; by Alphonse L. Pinart (*Author*). Twelve Months in Madagascar; by Joseph Mullens, D.D., 1875 (*Author*). And the current issue of Corresponding Societies, &c.

DONATIONS TO THE MAP-ROOM FROM APRIL 27TH TO JUNE 14TH, 1875.—26 Sheets of various Maps of the European Kingdoms (*Lord A. Russell*, M.P.). Map of the Argentine Republic, Chili, Paraguay, and Uruguay, from various authorities; by Dr. A. Petermann (*Major F. I. Rickard*). MS. Map, showing the route of J. Forrest, F.R.G.S., from Champion Bay to the Overland Telegraph line, Australia (*Author*). Map of the district of San Juan, Colorado, U.S., in outline; by A. D. Wilson (*F. V. Hayden, Esq., U.S., Geologist*). 20 Sheets of the Ordnance Survey, on various Scales (*Sir H. James, R.E., Director*). Map of the Central Provinces of Madagascar; by J. Mullens, D.D. (*E. Weller, Esq.*). Map of the southern portion of the Province of Southland, New Zealand; by T. Heale, Chief Surveyor (*James Harvey, Esq.*). 4 Sheets of the Geological Map of Sweden, each accompanied by an explanatory hand-book (*Otto Torell, Chief of the Geological Survey of Sweden*). Map of Asia Minor; Map of G. Rohlf's Expedition in the Lybian Desert; Map of Cape Colony; Map of the ice-drift of the Austrian Expedition under Weyprecht and Payer (*Dr. Petermann*). Portraits of Dr. Kane and Captain Fitzjames in frames (*J. Barrow, Esq.*). Coloured Photograph of H.M.S. *Terror*, Captain G. Back, in Frozen Strait; the crew saving the boats and provisions (*Sir G. Back*, D.C.L., F.R.S.)

Before the commencement of the ordinary business of the evening, the PRESIDENT announced that the Council had decided on holding a meeting of the Society on the 28th instant, in order to make up for that which was deferred in the month of May in consequence of the sudden death of Admiral Sherard Osborn. At the meeting on the 28th the Sultan of Zanzibar would be present. His Highness, as members were aware, was one of the few foreign Honorary Members of the Society, and had deserved well of all geographers, inasmuch as it was mainly owing to his encouragement and support that the recent expeditions for the Exploration of the Interior have been able to succeed so well in making Zanzibar their starting point. It was therefore incumbent upon them to give him a cordial welcome.

Referring to the special business of the evening, the PRESIDENT said the paper to be read by Sir Leopold M'Clintock would be of interest at any time, but was peculiarly so now that a New Arctic Expedition had just left England. Sir Leopold M'Clintock had been a most successful explorer himself, and had brought the system of sledge-travelling to such a degree of perfection that it had become the most effective means of Polar exploration.

On Arctic Sledge-travelling. By Rear-Admiral Sir F. LEOPOLD M'CLINTOCK, F.R.S.

So widespread an interest in the subject of Arctic geographical research has been evinced, that I am encouraged to believe that some details of the means by which that research is chiefly effected may not be uninteresting to those who are here present. And in this belief I have undertaken to give an outline of sledging exploration.

My subject has one feature peculiarly its own—it is this: whereas all other geographical discoveries are performed either by land or by water, modern Arctic exploration into the higher regions of the Frigid zone, is prosecuted independently of either, and the ice, which arrests the progress of the ship, forms the highway for the sledge.

In early Arctic voyaging, the ship alone was relied upon for penetrating into unknown seas.

In the second and third voyages of Parry, and the second voyage of Sir John Ross, between 1821 and 1834, sledging was commenced, and a number of short journeys were made, mainly by the assistance of the Esquimaux, whose methods were closely observed and more or less imitated.

But our seamen had not yet familiarised themselves with the idea, that it was quite possible for well-equipped Europeans not only to exist, but to travel in an Arctic climate, as well as the Esquimaux themselves; and it was not until the Franklin Searching Expeditions were sent out, between 1848–54, and thus a motive far stronger than that of geographical discovery was supplied, that men seriously reflected upon the possibility of any extensive exploration on foot. And no more powerful incentive could have been imagined to rouse the utmost energies of the searchers, than the protracted absence of the missing Expedition.

The endurance of the hardiest was called forth, and the talent of invention evoked and stimulated, until at length a system of sledging was elaborated, such as I will now proceed to describe.

It may be as well here to explain, that sledge-travelling is limited to the spring months. It cannot be commenced until there is sufficient daylight; it cannot be continued after the summer thaw has denuded the land of snow, or rendered the sea-ice unsafe: therefore it can seldom be prosecuted with advantage before the month of April, or later than June.

The late Admiral Sir James Ross, the distinguished Commander of the Antarctic Expedition, who had served with very great credit in all the six voyages of Parry and John Ross, from 1818 to 1834, formed the connecting link between them and the Searching Expeditions, which commenced in 1848, and the first of which he commanded. He was acquainted with the flat sledges of the Hudson's Bay territory, which alone can be used in deep snow, gliding as they do over its surface; he was also acquainted with the Greenland dog-sledge, with its high narrow runners shod with ivory or bone, and which cut down through the usually thin layer of snow, and run upon the ice beneath; he was familiar with the various modifications of these typical forms, which had been used in the Arctic Expeditions of Parry and John Ross.

He had, moreover, made several journeys with the natives of Boothia Felix, culminating in his discovery of the Magnetic Pole; and, on one of these journeys, he was absent from his ship for the *then* unprecedented period of twenty-nine days.

It was under his directions that our sledges and tents were made in 1848; and these designs, with comparatively slight modifications, have continued in favour in all subsequent expeditions.

The tent requires but little description. It is merely a pent-roof, about 7 feet high along the ridge, supported on boarding-pikes or poles, crossed at each end, and covering an oblong space sufficient to enclose the party when lying down, and closely packed together. Its duty is merely to afford shelter from the wind and snow-drift, and its weight, when completely fitted, is, for a party of eight men, only about 40 lbs. It is made of light closely-woven duck.

The sledge is a much more important article of equipment. That which our experience has proved to be the most suitable is a large runner-sledge.

It must be borne in mind that I am speaking of latitudes beyond the 70th parallel, where, unlike regions which lie somewhat less remote, the fall of snow is less considerable and never deep; and, moreover, that our sledges often have to be drawn over the sea-ice when flooded with water a foot in depth.

The runners are rather broad, that is, 3 inches, and they stand high, carrying the lading about a foot above the ice. An average-sized sledge is 3 feet wide and 10 feet long, and is drawn by seven men. It is constructed with only just so much strength as is absolutely necessary, since every pound of weight saved in wood and iron enables so much more provisions to be carried. All our sledges have been drawn by the seamen, and the labour of doing so is most excessive.

The first sledge expedition in the search for Franklin was led by Sir James Ross in person. By very great efforts a distance out and home of 500 statute miles, was accomplished in forty days; but out of the twelve picked men by whom the two sledges were drawn, five were completely knocked up, and every man required a considerable time under medical care to recruit his strength, after this lengthened period of intense labour, constant exposure, and insufficient food.

Throughout this paper, the distances will be in English statute miles, as being most generally understood.

It is necessary to apprehend clearly the nature of the surface over which our sledges have to travel.

People unacquainted with the subject, commonly fall into one or other extreme, and suppose that we either skate over glassy ice, or walk on snow-shoes over snow of any conceivable depth.

Salt-water ice is not so smooth as to be slippery; to skate upon it is very possible, though very fatiguing. But hardly is the sea frozen over, when the snow falls, and remains upon it all the winter. When it first falls, the snow is soft, and perhaps a foot or fifteen inches deep; but it is blown about by every wind, until having become like the finest sand, and hardened under a severe temperature, it consolidates into a covering of a few inches in depth, and becomes so compact, that the sledge-runner does not sink more than an inch or so: its specific gravity is then about half that of water.

This expanse of snow is rarely smooth: its surface is broken into ridges or furrows by every strong wind. These ridges are the "*Sastrugi*" of Admiral Wrangell; and although the inequalities are seldom more than a foot high, they add greatly to the labour of travelling, especially when obliged to cross them at right angles.

As the spring season advances, the old winter snow becomes softened, fresh snow falls, and sledging is made more laborious still.

At length the thaw arrives; the snow becomes a sludgy mixture, with wet snow on top and water beneath, through which men and sledges sink down to the ice below. It is now almost impossible to get along at all; but in a few days the snow dissolves, and we make fair progress again over the now flooded ice.

Our dry provisions and clothing are so packed upon the sledges, as to be protected from the wet, but everyone is of course drenched, and remains so during the march through this ice-cold water. This is cold-water cure in real earnest, but I would not recommend any one with the slightest suspicion of a rheumatic tendency to try it!

Later still, the water drains off the sea-ice through cracks or holes decayed in it, and only tortuous pools of water remain upon it.

Later than this, sledge-travelling, without the accompaniment of a boat, becomes unsafe.

Such is the nature of the travelling, when the sea-ice has not been crushed up into hummocks, or masses of various sizes and shapes.

We seldom find either unbroken ice, or ice so crushed up into ridges that we cannot get over it at all; but, as a rule, crushed up or hummocky ice, three or four feet in height, is of very frequent occurrence, and of course adds much to the labour of sledging.

Having accompanied Sir James Ross on his sledge-journey in 1849, I was entrusted with the preparations for sledge-travelling in the second and third searching expeditions, under Austin and Belcher; and this method of exploration now became recognised as an important feature of these voyages.

The utmost attention was devoted to the travelling equipments, and to the methods adopted by Wrangell and other distinguished Arctic travellers; and the spring parties of the second expedition set out in 1851 on the 15th April, instead of the 15th of May, as in 1849; and the sledges, carrying forty days' provisions, were dragged with less labour than thirty days' rations had previously occasioned: moreover, the allowance was a much more liberal one. The result was a corresponding increase of work done: one party remaining absent for eighty days, and making a journey of 900 miles.

But in 1853 and 1854, the sledge parties of the third searching *expedition did still* better service: one party accomplished about

1400 miles in 105 days. Another party, having several depôts along its line of route and favourable circumstances generally, travelled nearly 1350 miles in seventy days.

These two journeys, which have not yet been surpassed, are deserving of our special notice.

The first was purely an exploring journey. Melville Island, which is some 50 miles broad, and is of moderate elevation, had to be crossed and recrossed. At the outset, very heavy loads had to be dragged; and ignorance of the direction in which the unknown coast-line might trend, interfered with the deposit of provisions to serve for the return journey; nevertheless, the daily average march was 12 miles. The second was a despatch journey, and it shows how rapidly ground can be got over with a tolerably light sledge, under somewhat favourable circumstances; and it is a feat which the sailor, who is not generally credited with good marching powers, may justly point to with pride: throughout this journey the daily march averaged the astonishing distance of 20 miles.

These facts afford the strongest proof of the suitability of our travelling equipments.

In any comparisons which we may make between these and any other marches, we should bear in mind, that this Arctic work is not merely marching, but that a sledge, often heavily laden, has to be dragged the entire distance.

The provisions and the clothing found to be most suitable may now be briefly described.

Tea, chocolate, biscuit, preserved meat, and pemmican are commonly used. Pemmican is a description of preserved meat used by the Indians of North America, from whom it has been copied. It is a preparation of beef, whereby all that is fluid is evaporated over a wood fire; the fibre is then pounded up, and mixed with an equal weight of melted beef fat; no salt or preservative of any kind is used; and no more concentrated food for working-men in a cold climate is known.

With chocolate, biscuit, and a little warmed-up pemmican, the traveller makes a good breakfast; a few ounces of specially-prepared bacon, almost free from salt, some biscuit, and a mouthful of grog, forms his hasty luncheon on the march; and on encamping, he has his supper of warmed pemmican, or other preserved meat, and tea.

Rum is the spirit used in the Navy, and therefore in our Arctic ships. If the men were not accustomed to the use of spirits, I think that, except on special occasions when a stimulant is desirable, they would be even better without it, as an equal weight of some nutritious food might then be carried instead of it; however, the ration of rum is very small.

This simple dietary is invariable, except when the party is so fortunate as to procure game; and then the awkward question crops up, of fuel wherewith to cook it. We are at a disadvantage with those hardy men who are content to cook their meat with frost; although a sandwich of frozen bear's blubber and biscuit is palatable enough, and I think most of the gentlemen in this room would agree with me, if they were fairly educated up to it, by a few days' sledging in the month of March.

All our cooking is done with lamps, the fuel being either spirits of wine, or some fatty substance such as stearine of cocoa-nut oil, tallow, or blubber. The latter alone is used by the Esquimaux; we prefer the stearine, as it cooks more rapidly and makes less smoke, and the stearine-lamp suits equally well for blubber, or any animal fat procurable on the march.

The clothing of the men is a subject of equal difficulty and importance; it must be suited to the temperature under which they travel, and this often ranges over 100 degrees, that is, from +50° to −50°; it must not suffer by frequent wettings, and should dry quickly; and, as only the outer wrappings of the feet are ever taken off while the frost lasts, it should also be suitable for sleeping in.

Our system of dressing is this: soft, warm woollen articles under a cloth which is impenetrable to the wind, and is commonly known as box-cloth; and this again under a suit of closely-textured duck overalls, as snow repellers.

The feet are wrapped in squares of blanketing, and covered with leather moccasins during extreme cold; or with duck boots, having leather soles, for moderate Arctic cold or for wet.

The entire suit of clothing in wear weighs from 16 lbs. to 21 lbs.

The tent furniture consists of a Macintosh floor-cloth spread upon the snow, over which is a thick duffle blanket, and upon this the men lie down in their sleeping-bags, which are made of the same material; and another duffle blanket is then drawn over the party, their knapsacks serving as pillows.

It will be noticed that furs are not used. Although they are very warm and agreeable when in good condition, to sit in, to sleep in, or even to work in where they can be dried each night before a fire; and although they have been generally used hitherto, yet they have been deliberately set aside for such dresses as I have described; because we have found that they check the escape of evaporation, they more readily absorb moisture, are more difficult to dry, and shrink much when wetted and frozen. I speak of such furs as are commonly procurable in this country. Those which have been dressed by the Esquimaux or North American Indians are much better suited to our rough work.

Let us imagine the scene when spring travelling-parties set out from their ships, to explore the unknown expanse before them.

It was on the morning of the 4th of April that they started from the *Resolute* and *Intrepid*, commanded by the late Admiral Sir Henry Kellett and myself, at Melville Island. Out of the 88 individuals composing the crews of both vessels, 71 were away sledging at one time; each separate sledge party consisting of 1 officer and 6 or 7 men.

Each sledge hoists a gay silken banner, emblazoned with some heraldic device, some pointed motto, perhaps the name given to the sledge, or perhaps some mysterious initials, known only to the leader of the small party—a little mystery, however, which only awaits the return home of the Expedition for its satisfactory solution.

After mutual cheers, they part upon their lonely and toilsome mission. But, trying as is the work before them, it would be difficult to over-rate the enthusiasm displayed. They have just passed through many months of darkness and confinement on board, spent chiefly in preparation for this great spring effort; nor is the keenest emulation wanting to complete a most impressive and characteristic display. Strong sense of duty, and an equally strong determination to accomplish it—dauntless resolution and indomitable will; that useful compound of stubbornness and endurance which is so eminently British, and to which we Islanders owe so much—certainly our colonies and our commerce, possibly even our existence as a nation.

These lonely little parties, daring and enduring so much, resemble sparks from that great fire which, I venture to say, is not yet extinct in this nation—the ardent love of the most adventurous enterprise.

Each officer leads his party, selecting the route, jotting down everything noteworthy in his diary, making a running survey as they advance, and checking his estimated distances by astronomical observations. He is also constantly on the look-out for game. When he can leave these ordinary duties, he takes part in the manual labour of dragging the sledge. Clothed and fed like his men, he is housed, or rather tented, exactly as they are, sharing in all things with them; thus he becomes something more than the leader, or even the head of the party: he is its very pulse. These relations fairly established, he receives, in return, the most implicit confidence and devotion of his people. If he reserves anything for his own private use, it is his spoon: there being, of course, no washing up of mess-traps after meals in frosty weather.

In the extensive sledging operations of the third and last Government Searching Expedition, our entire immunity from severe frost-bites was in strong contrast with the second Expedition, where there were some thirty cases of seriously frost-bitten feet; and this fact affords most satisfactory proof of the greater efficiency of the men's clothing.

Before taking leave of these spring parties, let us glance at them on the march, and notice the amount of work accomplished by those we have already alluded to.

During the month of April, the snow is hard, and favourable for travelling, but the winds are, of course, still very cold; and if at all fresh, frost-bites are almost constantly playing about the men's faces. Thirst is also a good deal complained of. May differs in being milder: the sun is now constantly up; snow-blindness is more frequent than frost-bites, and, to avoid it as much as possible, the travellers sleep by day, and march by night. Some fresh snow falls, and therefore, although the sledges are lighter, the labour of dragging is scarcely diminished. Between the old frost-bites, the keen winds, and strong sun, all faces are badly blistered; most noses are absolutely raw, and, finger-tips quite callous from frequent, though slight, frost-bites. Early in June, a few Eider ducks, gulls, and ptarmigan appear. As the month advances, the snow becomes very soft. Soon the thaw bursts forth; the land is rendered impassable by innumerable streamlets; the sea-ice is flooded, and the whole aspect of nature has suddenly changed.

Matters now look serious. But frost-bites are things of the past; even snow-blindness is less troublesome, and the abundance of water is an unspeakable relief. Those who have soap are now tempted to use it! This, however, is the season for rheumatic pains, consequent upon the daily march through ice-cold water. It is well to avoid such late travelling as this.

The travellers return with prodigious appetites; they weigh on an average 12 lbs. less than when they set out; they are reduced in strength as well as in flesh, yet they can walk for hours without fatigue; their sight for distant objects is much more keen, and their powers of observation of external objects, such as traces of men or animals, &c., much sharpened by exercise: in fact, they have advanced a stage towards the condition of the North American Indian.

The nine sledge parties employed in the spring of 1853, from the *Resolute* and *Intrepid*, accomplished in the aggregate 7000 miles, and discovered and explored about 1800 miles of coast-line. This single spring season's travelling may be taken as a suitable basis for calculating what possible amount of work may be performed by the out-going Arctic Expedition, provided that all the circumstances prove to be somewhat similar.

In the spring operations alluded to, Captain Nares took a share, and played his part well, giving proofs of those high qualities, which have since borne such good fruit, and which so amply justify his translation from one very interesting and important command, to another still more important, more difficult, perhaps the most difficult to which a commander could aspire.

In the Government Searching Expeditions we gained no experience of snow-houses, and but little of sledging with dogs, yet that little was sufficient to convince us of their value. For instance, during the spring of 1854, our only team of dogs was kept constantly at work, and, without counting occasional short trips, they accomplished, in sixty days' travelling, 1830 miles, affording an average rate of 30 miles, their sledge on the whole being rather lightly laden. On several occasions they performed the distance of 60 miles between the *Assistance* and *North Star*, in from twenty to twenty-four hours.

The Government having finally abandoned the search, Lady Franklin nobly determined to make one more effort, and in 1857 she sent out the little *Fox* under my command.

As our entire crew numbered only twenty-four souls, the employment of dogs now became a necessity; accordingly twenty-four were embarked. In the spring of 1859 we sent out from the *Fox* three separate divisions of search, each consisting of six men and six or seven dogs; each division accomplished about 1000 miles of distance, and men and dogs worked harmoniously together for the lengthened period of nearly eighty days.

Dog-driving is so well-known that but little need be said here about it. Sometimes there was a little delay at starting, the dogs not allowing themselves to be caught and harnessed. Their harness consists of a few strips of canvas, and a single trace of about 12 feet long, the leading dog having a longer trace than the rest. Once started they are guided by the whip, which the driver should be able to use effectively with either hand. As the dogs on each flank are most exposed to its influence, there is a continual striving to get into the middle, by jumping over each other's backs, so that it is often necessary to halt, pull off one's mitts, and, at the risk of frozen fingers, disentangle the traces, which have become quite plaited up together. When a dog feels the lash, he usually bites his neighbour, who bites the next dog, and a general fight and howling begin. The lash is no longer of any avail, and the driver is compelled to restore order with the handle of his whip. The journey is then more briskly continued for a little time, and so on throughout the march, until at length camping time arrives.

The moment our weary dogs were allowed to cease dragging, they fell asleep, and remained motionless, until the cook for the day commenced chopping-up the pemmican, or the dog's meat. At the first sound of his axe they would spring up and surround him like so many famished wolves, darting upon any splinters of meat which flew off, or watching an opportunity to steal some pieces. Besides this severe trial of the cook's temper, more of his time was spent in chopping at the dogs than in chopping up the frozen supper. We were careful not to feed the dogs until an hour after halting; when that time arrived, their food (commonly frozen seal's or bear's flesh) was strewed over the snow, and trampled into it, before the *rush* for supper, so as to enable the weak ones to secure an equal share with the strong. I think this was the only care we found it necessary to bestow upon them. We were, of course, obliged to take numberless precautions against them, removing out of their reach anything which they could eat or gnaw.

Dogs are most useful when dispatch is required, or when the temperature is so low that it is undesirable to expose more men than is absolutely necessary. Two men, with a good team of a dozen dogs, can travel with astonishing speed; the men securing themselves each night against frost-bite in a small snow-hut or burrow, when they can find a sufficient depth of snow to do so, but this is by no means always the case on sea-ice at a distance from the land. In this manner I made a journey of twenty-five days, with fifteen dogs, a driver, and an interpreter. We started on the 17th of February, and accomplished 420 miles; the temperature, which was sometimes as low as $-48°$, averaged $-30°$ throughout. Snow-huts were built each night, although we were very slow and clumsy masons, requiring an hour and a half, instead of from one half to three-quarters of an hour, to house ourselves. My dog-driver, whose previous experience had taught him what luxuries this mode of travelling was capable of, used to sleep warmly enough, with one dog at his back and another at his feet! An Esquimaux dog is more remarkable for the thickness of his fur than for anything else. He has a broad head and chest, keen scent, and strong dislike to the water. Our largest and best dogs measured 23 inches high at the shoulders, and weighed about 70 lbs. when in fair condition. Two dogs require the same weight of food as one man, and they will draw a man's full load for about one-fourth a greater distance than the man would. If both man and dogs are but lightly laden, the dogs will almost double the distance which the man could do.

I have now completed my brief outline of Arctic sledging operations, down to the return of the *Fox*, the last of the English expeditions.

All the experience gained in that memorable series of voyages between 1818 and 1859 has been brought to bear upon the equipment of the Expedition of 1875, and it is further intended that dogs and snow-huts should be used to a considerable extent.

As on former occasions, so now also, upon the persistency of their efforts in sledging will mainly depend the amount of their success.

To sledging we are indebted for almost all our modern Arctic achievements.

To it we confidently look, as a means of escape where neither ships nor boats would avail. And here, permit me to quote from a paper which I wrote some years ago:—

"It is now a comparatively easy matter to start with six or eight men, and six or seven weeks' provisions, and to travel some 600 miles across snowy wastes, and frozen seas, from which no sustenance can be obtained. There is now no known position, however remote, that a well-equipped crew could not effect their escape from, by their own unaided efforts."

I had the great satisfaction of learning from Lieutenant Payer, when he recently visited this country, that these words of mine afforded very great encouragement to him and his companions, when their ship became inextricably beset, and when she was finally abandoned in the 80th parallel of latitude.

To sledging we owe many thousand miles of coast-line discovered and explored. And, finally, the recovery of the sad, but glorious, record of the heroic deeds of Franklin's Expedition. And to sledging we shall owe the principal share of whatever work may be accomplished by the brave men who have now gone out.

What their measure of success may be, none dare predict.

The public mind, perhaps unaware of the formidable difficulties which surround it, points to the crowning glory of reaching the North Pole—that goal of so much ambition and endeavour.

This consummation is possible, and may the high distinction be theirs! But it is only fair to state, that so little practical improvement could be effected in the equipment of travelling parties, that we cannot reasonably expect that the sledging exploits of 1853 and 1854 will be eclipsed by those of 1875.

However, what has been done will be done again, if the state of the ice is at all similar; but of this we are, of course, uncertain. This is a grave uncertainty. We know that an open sea has been found at no great distance off the Siberian coast; and that it rendered nugatory all Wrangell's attempts to sledge northwards. Yet it is worthy of remark that Wrangell was one of the first, if not the very first person, to suggest an attempt to reach the Pole from Smith Sound.

No reliable indications of a similar state of things to that which he experienced off Siberia has been found anywhere northward of the islands and shores of America. We have occasionally been startled by announcements of open water; but a little further exploration has proved these iceless spaces, or Polynias, to be very limited in extent, and solely due to local and apparent causes, such as currents or tides, and they have only been found in straits, and not to seaward of an open coast-line.

Captain Nares has this advantage over Wrangell, that he is provided with boats fit to navigate a partially iceless sea, should his sledging be interrupted by water. Now, we know that the failure of Parry's attempt to reach the North Pole in 1827, was largely due to the great weight of his boats, and the consequent difficulty of dragging them over the ice. This error we have attempted to correct, by supplying boats of considerably less than half the weight of Parry's.

But Arctic explorers are well aware that there is one condition which bars all progress: and that is—ice which is too thin to sledge over.

Let us hope that our explorers may not meet with any such insuperable difficulty.

We know full well that ordinary obstructions will but strengthen their determination to solve the great geographical problem committed to them; and we have the satisfaction of knowing that this national undertaking could not be placed in abler hands. They will carry with them the assurance that they have not only our heartiest wishes for their success, but our entire confidence in their resolute endeavours to deserve it.

Admiral Sir Richard Collinson said, when the expedition in which he was engaged left England in 1850 they had the advantage of the experience gained up to 1849; but as they did not return until 1855 they could not profit by the improvements made in the intervening years, and were thrown upon their own resources. They never enjoyed the pleasure of scudding under easy sail over the ice, or the luxury of driving fourteen-in-hand. Three of the Eskimo dogs were embarked as the ship passed through Behring Straits, and others were subsequently purchased from the Esquimaux. It was our habit to harness three dogs next to the sleigh, and then to man the drag-ropes in front of them. Still they got through a great deal of work—in a great measure owing to the assistance they had from dogs. They became so attached to the ship, that when the ice broke up, and they could not get on board in any other way, they would go round for miles so as to get on the pack on the opposite side, and so reach the vessel. On one occasion, in travelling up the Victoria Strait, and the thirteenth day of absence from the ship, they were aroused by the dogs giving tongue. The disturbance was caused by the presence of a bear, and the party set off in chase, but were unable to overtake him. When they returned to the sledge, they found that a favourite dog was missing. They waited some time, but at last had to go on without him. In the middle of the next night, however, the dog overtook them. In all probability he had chased the bear, and brought him to bay, and stuck by him, hoping that the party would come up; but eventually had to abandon the bear, and had the sagacity to follow the new track of the sledge instead of that which led back to the ship. When he returned, nothing would satisfy him but to enter the tent and salute every one. He believed great things would be accomplished by the new Expedition; but still, as Sir Leopold M‘Clintock had said, difficulties might be encountered which would prevent the attainment of the grand success which was hoped for. All that could be done, however, would be done by Captain Nares and his men. As Captain Allen Young, who was about to leave England on an independent private expedition, had left the meeting, he would state, for the information of the Society, that it was the intention of Captain Young first to follow (according to arrangement with Captain Nares) the track of the *Alert* and *Discovery* as far as the Carey Islands, where he would leave letters for the Expedition, and then endeavour to penetrate westward. Whether he would follow his own former track when serving with Sir Leopold M‘Clintock in the *Fox*, or that of the *Erebus* and *Terror*, must depend upon the state of the ice. The *Erebus* and *Terror* got from Beachy Island to Victoria Strait in one season; but in attempting to pass through that strait they were blocked by the ice, and remained there for 18 months, until the ships were abandoned. If Sir John Franklin had known that King William's Land was an island, instead of attempting to get through Victoria Strait, he would have followed the Boothia shore-line, and so got out. He hoped the *Pandora* would be able to do that; and when it is remembered that Dr. Rae in his boat coming from the westward reached a point on the opposite side of Victoria Strait, in the same latitude that the *Erebus* and *Terror* were abandoned, and that the *Enterprise* wintered at Cambridge Bay, it would be seen that there was but a very short distance more to accomplish the whole passage. Ice-navigation was so uncertain that it would be an impropriety to hold out any very great hope, but he saw no reason why the *Pandora* should not accomplish the North-West Passage in one season.

Dr. Rae said he had listened with great pleasure to the admirable paper that had been read. The wonderful way in which Sir Leopold M‘Clintock carried out the expedition in the *Fox*, showed an indomitable courage and energy which must be the admiration of everyone. He, however, differed from Sir Leopold as to the kind of sledge best adapted for Arctic work. He tried the runner-sledges in 1847, and made a journey of more than 700 miles; but on the second journey of 590 miles the ice was so rough that no sledges could be used, and everything had to be carried. He had brought with him to the meeting a rough sketch of the sledge which he considered best adapted to the work. Flat-bottomed sledges were used in the large lakes, such as Superior, Winnipeg, and Bear Lake; but in the spring those lakes were covered with water, and therefore, when a sledge had a load of fine furs, the cargo must be so raised that the water could not reach it. Dr. Rae then described, with the aid of diagrams which he exhibited, the formation of his flat-bottomed sledge. It could not sink, he said, more than an inch or two, for the moment the snow got beyond the runners the whole of the flat body of the sledge rested on the snow. The runners were shod with steel and rounded off, so that the friction was extremely small. He was delighted to hear that the new Expedition would have recourse to snow-houses, which would enable them to reduce the weight on the sledges, there being no tents to carry, and less bedding. The sailors might soon learn to build snow-houses nearly as quickly as the Esquimaux. In crossing land the flat-bottomed sledge would be found of great advantage. The long journey made by the late Lieutenant Mecham was excellent, but he had the advantage of four or five depôts, with provisions, each way homeward and outward on the route. The great difficulty was the carrying provisions for the whole journey. When Sir Leopold M'Clintock was out 105 days, he also had some advantages, for he killed as many musk-oxen and deer as he liked, the marrow of which would give fuel, whilst the flesh gave food.

Admiral OMMANNEY expressed his admiration at the able way in which Sir Leopold had treated his subject; as they had served together in the Franklin Search, he had nothing more to add on the subject of sledge-travelling, so fully described in the paper. He (Sir Leopold) had, however, omitted to mention one of the great feats which he performed in 1851, when he made a journey of 900 miles in eighty days, and settled the question as to whether or not Sir John Franklin had wintered in Melville Island. He himself (Admiral Ommanney) was at the same time away from the ship for sixty days, and they both returned without any reduction in their size, and better in health than when they started. Even if Captain Nares only equalled what had been done before, during the search after Franklin, he would explore a great deal of the hitherto unknown Polar region. No fear was to be apprehended about the safety of the Expedition; and even if the Pole were not reached, he should be satisfied if Captain Nares came round the north of Greenland and returned to England by the East coast. No Expedition had ever left this country so perfectly equipped, and no finer sailors had ever visited the Arctic regions.

Admiral RICHARDS said it would be much to be regretted if an impression was allowed to go abroad that the Expedition had not been perfectly equipped as regards the sledging operations. Due credit must always be accorded to the officers of the Hudson Bay Company for the extraordinary journey they had performed, both in the ordinary routine of their duties and in the search for Franklin; and, no doubt, they adopted the kind of sledge and other equipment which their long experience taught them was best suited to their requirements; but their mode of travelling differed in many respects from that inseparable from Naval Expeditions. The former were mostly performed over land-snow, while the latter were almost exclusively confined to the frozen sea, and over every condition of ice—from smooth to rugged, and from rugged to the heaped-up pack frequently over 20 feet high; and the strongest possible discription of sledge frequently gave way over the heavy ground it had to encounter. As to snow-houses, it must be remembered that out of the maximum period when travelling was possible, about 120 days, nearly one-third of the time the floe was bare of snow, and in its place a foot or 18 inches of water frequently prevailed, under which circumstances it would be difficult to construct snow-houses. Tents, therefore, which weighed something less than 40 pounds were invariably adopted by the Naval Expeditions. Of course, many present could not be expected to understand the detail of Arctic travelling, or to be able to judge between the rival plans of the Hudson Bay officers and the Navy. It was all the more necessary, therefore, that distinct and unmistakable opinions should be given by those who have had the benefit of experience. It must be borne in mind that Arctic travelling is not in its infancy, but was brought to perfection more than 20 years ago. It was not to be expected, nor can it be hoped, that the present Expedition will perform greater feats of travelling than their predecessors, nor is it necessary they should to ensure entire success. In his opinion, everything connected with the equipment of the present Expedition was as nearly perfect as it possibly could be, and if any one part of it was more perfect than another, it was undoubtedly the travelling equipment.

Sir LEOPOLD M'CLINTOCK, in reply, said Dr. Rae and himself had talked over the details to which Dr. Rae had alluded, twenty years ago, and they were thoroughly acquainted with each other's views. If Dr. Rae had really and sincerely felt that he could have aided the Arctic Expedition by his diagrams and plans, he undoubtedly would have exhibited them before the vessels started. The method of utilizing a flat sledge for travelling over flooded ice, by raising its cargo a foot or 14 inches in order to keep it dry, was a very good makeshift, but nothing more; it would be topheavy, and upset the moment it attempted to move over hummocks. No Government Expedition had ever left this country without being provided with flat sledges, and abundant opportunity had been afforded of testing them, but they had been invariably discarded. He had taken them with him, and had found that when the cargo was on them they rolled over when they came to hummocky ice. Everyone could understand that for ice of any kind it was better to have steel runners, after the fashion of skates. If they trusted to Dr. Rae's flat sledges, and when 300 or 400 miles from the ships the provisions were upset, wetted, and spoiled, it would be unpleasant, to say the least of it. He himself had travelled nearly 5000 miles with sledges, and nearly 50,000 miles of sledging had been accomplished by the different Arctic Expeditions; there had been great competition among the leaders, each striving to invent something new, and it had been found that by grouping the men together better work was done than when small sledges, with only one or two men, were used. The longer the sledge the more easily it travelled, on the same principle that a large wheel would run more easily than a small one. Formerly sledges were only 10 feet long, but now they were made 14 feet; and for one description of work, namely, attempting to cross fissures and glaciers, they had 16-feet sledges. It would puzzle even Dr. Rae himself to carry a 20-feet boat to the Pole on a flat sledge; it was necessary to have large and wide sledges. The Arctic Expedition which had just started had sledges of different lengths: 16-feet; 14-feet (in which he hoped the Pole would be reached); 11-feet, to be drawn by seven men, and to do the great bulk of the work; 8-feet, for carrying dispatches, to be drawn by dogs; and 6-feet, or satellite sledges. His object in building these small ones was to enable the naturalists, with very little assistance, to drag their own specimens. He had used snow-houses in the *Fox* Expedition, and made it a part of the exercise during the winter to build them. He found that parties of four men each could hut themselves in about thirty-five minutes, under favourable circumstances; but the further north the Expedition went, and the further from the shore a party was, the less frequently was snow met with suited for building these houses. A tent to enclose eight men weighed only about 40 lbs., which was a mere trifle. It was Captain Nares' intention to make snow-huts wherever he considered it advisable, and he had been provided with snow-knives and saws, and everything necessary for the purpose. If a depôt were formed, say

100 miles from the ship, a series of snow-huts would be built between the two, so as to obviate the necessity, in such a case, of carrying tents.

Dr. RAE asked permission to make a few further remarks. The sledge he had described was nearly 2 feet broad, and would not turn over as Sir Leopold asserted. If a man walked at the head of it he could prevent its turning over, and could keep it as steady as was necessary. In 1851 he travelled in a flat sledge only 14 inches wide, near the Coppermine River, where there was deep water, and got along very comfortably. These sledges had iron runners on them, which would work on hard snow or ice, but the moment they came to soft snow the flat part or the sledge prevented it from sinking.

Mr. DALLAS asked what was the part of the Arctic Region in which the greatest cold occurred? He had spent several years in North America far to the south of the Arctic Circle, but the extreme cold there was not much less than the greatest he had heard of within the Polar Zone. Admiral Collinson had expressed an opinion that the greatest cold would be found near the Magnetic Pole.

Admiral Sir R. COLLINSON replied that the winter spent by the *Enterprise* in Cambridge Bay was colder than the winter spent by Sir E. Belcher and Captain Kellett, who were from 4° to 6° further to the north. There could be no doubt that an impression did prevail that the neighbourhood of the Magnetic Pole had some influence upon the temperature, but that was the result of only one year's observation.

The PRESIDENT, in concluding the proceedings, said these discussions with regard to sledge-travelling were of very great interest, because it was upon sledge-travelling that the success of the new Expedition mainly depended. There was no very determinate scientific advantage to be gained by reaching the Pole, though there was a certain popular sentiment with regard to that object, and no doubt the nation would be very much disappointed if the Pole were not reached. It was evident that if the expeditions which Sir Leopold M'Clintock had described had been directed northwards, instead of east and west, the Pole would have been reached. From the point where Captain Nares hoped to winter in 82° N., it was only 480 geographical miles to the Pole; and at the rate at which Lieutenant Mecham travelled, the journey would only occupy from 25 to 30 days. The great object of the Expedition was to run as far north as possible, and to establish depôts along the route, so that the intervals over which sledge parties would have to carry their own provisions might be as small as possible. If such depôts could be formed halfway between 82° N. and the Pole, there could be no doubt that the remainder of the distance could readily be accomplished. At the same time this was not the essential scientific object in view. All would be very much delighted if the Pole were reached, but even if it were not, there could be but little doubt that many valuable scientific results would be attained, which would be intrinsically of much greater importance. Admiral Collinson, when alluding to Captain Allen Young's Expedition, omitted to mention that along the coast there was an inexhaustible supply of drift-wood for fuel. The *Pandora* is a steamer; and if she could once reach the coast, this drift-wood would, no doubt, enable her to run to Behring Straits within the month. Of course, it would be impossible for her to carry coal sufficient for the whole voyage; but availing himself of the natural supply of drift-wood, Captain Allen Young might very possibly be the first officer to perform the entire North-West Passage from Baffin Bay to Behring Straits. All present must wish him success in his attempt.

Fifteenth Meeting, 28th June, 1875.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Edward Blount, Esq.*, C.B.; *Henry Bond, Esq.; Frank Buckley, Esq.; Hon. Guy Cuthbert Dawnay; J. M. Dunn, Esq.; Colonel Hon. W. Feilding; Right Hon. Sir James Fergusson, Bart.; Henry Jenkin Gotto, Esq.; Captain J. Tyndale Greenfield*, R.A.; *Staff-Commander Thomas A. Hull*, R.N.; *John William Hughes, Esq.; Rev. F. Charles Jagg; Lieut. F. George Innes Lillingston*, R.N.; *Athol Maudslay, Esq.; Earl of Mayo; John Edmund Middleton, Esq.; Daniel Louis Mundy, Esq.; Charles Orred, Esq.; Vice-Consul Phillips* (Kertch); *John Charles A. Scott, Esq.; Edward M. Warden, Esq.; Frederick Youle, Esq.; Edmund Coates, Esq.; Captain H. H. Hamilton Walshe; C. L. Webb, Esq.; H. G. Yates, Esq.; J. R. Madan, Esq.*

DONATIONS TO THE LIBRARY FROM JUNE 14TH TO JUNE 28TH, 1875.—U. S. Hydrographic Office, No. 54. Deep-sea Soundings in the North Pacific Ocean, obtained in the United States steamer *Tuscarora*, Commander G. E. Belknap. Washington, 1874 (*Commodore R. H. Wyman*). Geographic Travels in Central Australia, from 1872–74; by Ernest Giles. Map, 8vo. Melbourne, 1875 (*Author*, per Ferd. von Mueller). Sixth Supplement to the papers on the Eastern and Northern extension of the Gulf Stream, published by the U. S. Hydrographic Office. Map, April 1875 (*Commodore R. H. Wyman*). Description de l'Egypte contenant plusieurs remarques curieuses sur la Géographie ancienne et moderne de ce Païs, &c., composée sur les mémoires de M. de Maillet; par M. l'Abbé Le Mascriel. Maps and plans. 4to. Paris, 1735 (*S. M. Drach, Esq.*). Rambles in Istria, Dalmatia, and Montenegro; by R. H. R. 8vo. 1875 (*R. H. de Ricci, Esq.*). Queen Charlotte Islands, a narrative of Discovery and Adventure in the North Pacific; by Francis Poole. Edited by J. H. Lyndon. 8vo. Maps and plans. 1872 (*Author*). Hiawatha, the story of the Iroquois Sage, in Prose and Verse. 12mo. New York,1873 (Anon., per *R. H. Major, Esq.*). Nach den Victoriafällen des Zambesi; von Edward Mohr. 8vo. Maps and plans. 2 vols. Leipzig, 1875 (*Author*). Les Sphères terrestre et céleste de Gérard Mercator (1541 et 1551), note publiée à l'occasion de la réproduction de ces sphères à l'aide de fac-simile de leurs fuseaux originaux, gravés par Mercator et conservés à la bibliothèque royale à Bruxelles; par J. van Raemdouck. 8vo. St. Nicolas, 1875 (*Author*). Storia del Cristianesimo nell' Impero

Barmano, preceduto dalle Notizie del Paese; scritta dal P. Luigi Gallo. 12mo. Milano, 1862 (3 vols., forming vols. xviii. xix. and xx. of the Collezione di Vite dei più distinti Religiosi della congregazione dei chierici RR. di S. Paoli detti Barnabiti) (*Colonel H. Yule*, C.B.). Missione al Gran Mogor del P. Ridolfo Aquaviva della Compagnia di Gesù, Sua Vita e Morte; dal P. Daniello Bartoli. 8vo. Piacenza, 1819 (*Colonel H. Yule*, C.B.). Della Vita di Monsignor Gio Maria Percoto, Missionario ne 'Regni di Ava e di Pegu;' dal P. D. Michelangelo Griffini. Plans. 4to. Udine, 1781 (*Colonel Yule*). Department of the Interior Bulletin of the United States Geological and Geographical Survey of the Territories, No. 4, 2nd series. 8vo. Washington, 1875 (*Dr. F. V. Hayden*). And the current issues of corresponding Societies, &c.

DONATIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF 14TH JUNE, 1875.—A Sketch-Map of South Africa, showing the Seven Electoral Provinces of the Cape Colony; by C. E. Solomons (*G. Street, Esq.*). Karte des Ober-Engadin und des Bernina Gebirges, &c.; by J. M. Ziegler (*Author*).

At the commencement of the proceedings, Admiral Sir R. COLLINSON, at the invitation of the President, read the following extract of a letter from Sir Leopold M'Clintock relating to the departure of the *Pandora* (under the command of Captain Allen Young) for the Arctic Regions:—

"The *Pandora* came alongside the dockyard on Friday evening [June 25], and we all went on board of her on Saturday. She sailed for Cowes the same afternoon, and on leaving the wharf she was cheered by the spectators. The cheer was taken up by the ships in the harbour—the *Fox*, the *Duke of Wellington*, and the *St. Vincent*. I am sure it was as gratifying as it was unexpected by Young. The *Pandora* appeared to be very well fitted, and amply provided with everything for 18 months.

"Young brought Esquimaux Joe and a chart to my house, and put him through a series of questions about his journey with Hall to King William's Land. Admiral Richards and Mr. Leigh Smith were also present. I think Joe is both intelligent and truthful."

The first Paper of the evening was—

1. *Journey across the Western Interior of Australia.* By JOHN FORREST.

Mr. FORREST spoke as follows:—

My desire this evening will be to give you a short account of my last exploration across the western half of Australia, from Champion Bay on the west coast to the Overland Telegraph Line between Adelaide and Port Darwin,—a distance in a straight line of about 1400 miles, but in the way we were obliged to go of about 2000 miles.

With, however, such a fine map near me of Australia, I cannot resist the temptation of pointing out to you my previous journeys in Australia, which will occupy but a few minutes.

In 1869 I was selected by the Government of Western Australia to command an expedition to the eastward, the main object being to test the accuracy of the reports of natives that white men had been murdered many years before, and that their remains were still in existence. People naturally supposed they must have been the remains of Dr. Leichhardt or some of his party, who left the eastern coast of Australia in 1848 and had never since been heard of. We reached lat. 28° 41′ s. and long. 122° 50′ E., but were unable to find any trace of the reported remains, and set the public mind at rest on the question. A considerable extent of good country was discovered, but a larger portion was so densely wooded with acacia and low scrub as to be of little use. Extensive inland salt-marshes were met with; the largest being Lake Barlee, which you see on the map.

In the following year, 1870, the Governor of our colony, his Excellency Governor Weld, conceived the idea of opening up an overland route to South Australia, and I was requested to organise and command an expedition for that purpose. Although Mr. Eyre had travelled along the coast (round the great Bight) in 1841, very little was known of the country inland, in fact nothing at all. His map only showed Flinders' coast-line, and the chief remarks were such notes as these:—"Here the party were obliged to abandon a horse." "Here they were obliged to abandon everything." "Here they had to kill a horse for food." "Here the overseer was murdered," &c. So little, indeed, was known that it was not believed that there were no rivers running into the great Australian Bight; and it was even suggested that Mr. Eyre, having to travel at night, might have crossed the sandy bars without seeing them. All this was set at rest for ever by our expedition. We escaped most of the difficulties experienced by Mr. Eyre, and benefited greatly by the water marked on his chart, which we found in the positions described by him. Although there was little rain we were enabled to examine the country a considerable distance inland, and in five months reached Adelaide without losing a horse, a distance of 2000 miles. The result of this expedition has been that much of the country about Eucla has been occupied, and a telegraph line now is in course of construction, along our route and with my map for a guide, from King George's Sound to Adelaide, thereby connecting Western Australia with the telegraph systems of the world.

Having said these few words in explanation of my previous experience in exploration, I will try and give you a short account of my last and most arduous one. After considerable difficulty, and chiefly again by the support of Governor Weld, I was enabled to collect funds to equip this expedition; and on the 1st April, 1874, left Champion Bay, with my brother as second in command, and two white and two black men, with twenty-one horses and six months' provisions. Our instructions were to follow up the Murchison to its source, and to examine the country along the watershed of the rivers running to the north-west coast, and finally, if I thought it expedient, attempt to cross the unknown interior to the Telegraph Line. Just before leaving we heard of the success of the expedition under Colonel Warburton, whose route appears on the plan before you. He had experienced great difficulties and had been compelled to eat most of his camels. Before leaving I received from the West Australian Government the following short but graphic account of his expedition.

"Surveyor-General's Office, Perth,
"March, 27th, 1874.

"SIR,

"The gist of all the information I have from Colonel Warburton may be summed up in a few words.

"From the MacDonnell ranges in South Australia to the head of the Oakover River (which is about 150 miles from the coast), keeping between the parallels of 20° and 22° south latitude, he traversed a sterile country in which he states horses could not possibly exist; they would starve, as they could not live on the stunted scrub and herbage which the camels managed to keep alive on.

"The general character of the country seen was that of a high, waterless, slightly undulating, sandy table-land, with, in some parts, sand-dunes in ridges most harassing to traverse. There was nothing visible in the way of watercourses in which water could be retained; but they were successful in finding, at long distances, sufficient to maintain themselves and their camels as they fled, as it were, for their lives westward over the Sahara, which appears to be in a great part a desolate wilderness, devoid of life or of anything capable of sustaining life. Though this is a grim picture put before you, I would not have you daunted: your task is a different one, and one which all the colony is looking forward to see successfully completed by you.

"I have the honour to be, sir,
"Your obedient servant,
"MALCOLM FRASER, *Surveyor-General.*"

This report was not at all cheering, and I think most people, both in Western and South Australia, thought there was little chance of our succeeding. Colonel Warburton was the only one of four explorers from South Australia that succeeded. Mr. Gosse, Mr. Giles, and Mr. Ross, having been defeated in attempting to cross over to Perth. Two of the expeditions that failed were supplied with camels, and therefore there was every reason for supposing that we might fail, considering we only had a very ordinary lot of horses.

When it is remembered that a horse in poor condition can scarcely go more than a day without water, and when the sterility of the spinifex desert is considered, the great advantage of the camel, which can go from ten to fourteen days without water, can readily be seen. From my experience of the Australian continent, and I make this statement carefully, I have no hesitation in saying that with the camel there is little difficulty in going anywhere.

On the 1st of April last year (perhaps not a very auspicious day to start on) we left Champion Bay, as I said before. I was very sanguine of being able to accomplish what I had undertaken, but never expected to encounter such obstacles and difficulties as we afterwards did. I had no idea of any such large extent of country so utterly wretched. We reached Mount Hale, the farthest point known on the Murchison River, without much difficulty, and had a very pleasant time until we reached the watershed of the river in longitude 120°.

Travelling on, along grassy alluvial flats, with nice pools of water here and there, with ducks numerous and kangaroos plentiful, we thought we were going to have a splendid journey, and little knew what was in store for us on the other side of the watershed. I had anticipated finding a river running to the east; but when we arrived at the watershed, which I named the Kimberley Range, I found it was only a low rise, with a few dry watercourses leading from it, and, instead of a river running to the east, we had not gone many miles before we entered a spinifex desert, which lasted, without any break worth mentioning, for 600 miles.

Most of you present may have heard of the spinifex desert, and I will try to explain what it is like. As far as you can see in every direction stretch plains of apparently ripe corn, which is the grass or stalk growing out of the spinifex tufts. Spinifex is very sharp, and on that account is commonly called Porcupine Grass: it is the *Festuca irritans* of botanists. The grass is very disagreeable to walk through, and often makes the horses' legs bleed: when dry, horses will not and cannot eat it; the grass or stalk is so dry, and entirely without nutriment. Day after day, week after week, and for months, we fought against it; and in this fearful country, whichever way we turned, all was the same. A few grassy valleys of very small extent were sometimes crossed. One of these, in lat. 25°, long. 121° 21′ E., in which we discovered a magnificent spring, named by me the Weld Spring (after our Governor, who has been such a great supporter of exploration), is a very delightful spot. Abundance of water, game of every description, kangaroos and emus numerous, and pigeons innumerable; it certainly was a delightful break in the fearful monotony of our journey, an oasis in the desert. We were obliged to halt here three weeks, while we searched for water ahead; during the time we were attacked by fifty or sixty armed natives, and were compelled to fire on them. There were only four of us at camp when they attacked us. On two other occasions during our journey we were attacked; the first by about twenty, and the last by about a hundred natives. Each of the three times we had to fire on them; and although some were wounded, as far as we know, none were killed. We were now in the very heart of the desert; great care was necessary in moving on, and our horses were getting very poor. Our course of procedure was as follows.

Myself and a native would leave camp where there was water, and go ahead in search, leaving instructions for my brother to follow with all the party, one, two, or three days after us, as we thought expedient. Should we find water, we would rest until he overtook us, as he would follow our horses' tracks, and this would save us the trouble and labour of returning to bring them on. On the other hand, if we were unsuccessful, we had sufficient time to return and meet them before they got into any serious difficulty. On many occasions we found enough for our own two horses, but not sufficient for the main body of the party.

Our daily life during the six months we were away from civilization was as follows:—We had breakfast before daylight, being awakened by the man on watch (one always kept watch regularly in turns, two hours each), who would have the tea made if there was any water. At peep of day four of us went to collect the horses, which were often a long way off, leaving two at camp to pack up and get everything ready for saddling. As soon as the horses were all collected, we saddled up and continued on. We had to walk in turns the whole way, as our horses were too poor to carry us, the whole distance being nearly 2000 miles.

It would serve no good purpose my giving you a more detailed account of our troubles and labours in this miserable country; suffice it to say we got through it by the middle of August, and sighted the hilly country ahead that had been formerly visited by Mr. Gosse and Mr. Giles. Up to this time we had only lost two of our horses; but before we reached the Telegraph Line, owing to heavy travelling and scarcely any food, our losses were six. One poor old horse bore up wonderfully until within sight of the Telegraph Line, when he fell down and died in less than a minute: he died in harness like a good soldier.

The season was one of such great drought that, as soon as I got fairly on the tracks of the South Australian explorers, I determined to lose no time in reaching the settled districts. No rain had fallen since Mr. Gosse was here the previous year, and we had considerable difficulty in many places, owing to the water being dried up, and our depending too much on expecting to be able to stay where he had stayed. However, by continually moving on, we reached the Telegraph Line on the 27th September, and the Peake Telegraph Station (which is 636 miles from Adelaide) on the 30th.

We had about 60 lbs. of flour remaining, having finished everything else, and had abandoned about 300 lbs. of flour besides all the baggage we could possibly do without. We had been living chiefly on bread and water for about a month, except when we were fortunate in shooting game.

All our troubles were now over: we travelled down slowly towards Adelaide, and had quite a triumphal march all through South Australia. At every town we were entertained at public dinners and presented with congratulatory addresses; and on our arrival in Adelaide were honoured with a public reception, in which more than 20,000 people took part.

On our return to Western Australia we were received with much enthusiasm. No less than twenty addresses were presented to us, and I can never forget the kindness and attention we received.

Natives.—I will now say a few words about the natives we met with. They were very similar in habits and appearance to all others I have seen in different parts of the interior of Australia. They are entirely without clothing, and sleep with a fire on each side of them, without any hut, unless in very wet weather, when they make a very poor shelter with wood and thatched with grass. There are a good many of them even in the worst spinifex country, in which much wallaby exists. It may be thought by many that there must be plenty of water where there are natives, but it is not so. A native does not wash or cook with water: all he uses it for is to drink; therefore a small rock-cavity, with say from 20 to 100 gallons, will suffice a long while for a number of them, and they cover it up to keep it from evaporating; but that quantity goes a very little way with fifteen or twenty horses. The natives, again, know every little waterhole and spring; whereas we had to look for it, and might sometimes pass it. I have no doubt, that there are no parts of Australia, or scarcely any, that you could not travel over easily if you knew every watering place; but an explorer has to find all these places, and hence the difficulty. With us the guides to water were the encampments of the natives, the tracks of emus and those of the natives themselves; the flight of birds, such as pigeons, especially in the evening, was also an indication. Emus, however, I think, were our best guides, as they are birds which must have water regularly. The natives sometimes go a long way away from water, and get it from the roots of a species of Eucalyptus, called Mallee Scrub. They choose the roots, break them in lengths of about a foot, and stand them on end, when all the moisture drains out into a wooden dish. The traveller meets with great heaps of these roots, and it is a bad sign when in search of water.

I have made these few remarks to show that if the explorer does not meet with water, it does not follow that there is none; and also that a native does not require much to satisfy him, and is very unlike a horse in that respect.

Results of the Expedition.—I now beg to make a few remarks regarding the character and capabilities of the country we travelled over.

A great deal of the country from the west coast to the watershed of the Murchison is admirably suited for pastoral settlement, and is already being taken up and stocked; but after crossing the watershed as far as long. 128° E., I do not think it will ever be of much use. The whole of this immense tract is a slightly undulating spinifex desert, and the prevailing rock is the tertiary desert sandstone. From long. 128° to the Telegraph Line the country is in many places beautifully grassed, and most of it has been taken up already by the South Australians. But, perhaps, the greatest result of the expedition has been the addition to our geographical knowledge of the country. The western half of Australia has now been traversed from east to west through the centre along the 26th parallel, and all theories as to the nature of the interior of the vast continent are finally set at rest.

Future Exploration.—I will now venture a few words on the future exploration of Australia. As you all see by the large map before you, there is comparatively very little more to be done: all the geographical problems have now been finally solved, and the only remaining portion of interest is the small part in the north-west corner from Roebuck Bay to the Victoria River. This would be a very interesting expedition, as there are some fine rivers to be examined, amongst them the Fitzroy and the Glenelg. You would be certain of having good country to travel through, and would most probably accomplish all you would set out to do, viz., to examine all the country to the west of the watershed of the rivers running into the sea.

In my opinion, this is the only part of unexplored Australia that is worth examining. I am sorry to see the energy of Mr. Giles, under the auspices of Mr. Elder, of South Australia, almost thrown away in examining the country between the explored portions of South and Western Australia, keeping to the south of lat. 30°.

As you can easily see by the map, there is scarcely any unknown country there, and the character of it is tolerably well known; and more especially when such a splendid and interesting field (though of rather small limits) is to be found at the north-west.

Australian discovery has made very rapid strides within the last few years, and I feel convinced the day is near at hand when the whole of the available country of Australia will be occupied and stocked.

Conclusion.—And now, Mr. President and Gentlemen, I must not detain you longer. I have attempted to give you, in as short a time as possible, a brief account of our journey, and I thank you very much for giving me the opportunity. I can only add that, if I have omitted anything, I shall be very glad to answer, as well as I am able, any question that any of you wishes to put to me.

Sir G. BOWEN said that, having been for eight years Governor of Queensland, which occupies on the eastern coast of Australia a position similar to that of Western Australia on the opposite coast, no one could appreciate more highly than he did the service rendered by Mr. Forrest to the colonies. When he first went to Queensland some 500 miles of coast only were settled, *i.e.* from Brisbane to Rockhampton; but now a chain of flourishing settlements extended 1200 miles further, up to the Gulf of Carpentaria. Queensland was richer in coal, iron, and gold than Western Australia; but this latter colony had also many advantages, and might ultimately attain the same success as Queensland had already arrived at.

Mr. LEAKE (Speaker of the House of Representatives, Western Australia), enumerating the important explorations in which Mr. Forrest had been engaged, said that his first journey to Lake Barlee, in search of the remains of white men reported to exist there, and supposed to be those of Leichhardt and his party, quite settled that question, and proved that Leichhardt had not passed that neighbourhood. On his second expedition he accomplished the great feat of travelling from King George's Sound along the coast of the Great Bight to South Australia. In this, as in previous undertakings, he did his work well, and rendered great service to geography and to the colony. His discoveries had led to a large portion of the country being settled, and the neighbourhood of Eucla in the Bight was now largely stocked, the only difficulty being the want of water; but no doubt, as in other parts, permanent springs would be found when settlements were established. By his last expedition from Champion Bay to the Telegraph Line at Peake Station he had also done good and useful work. He had travelled with his brother and four assistants, two of them being natives, and 21 horses, right across the sandy desert, and thus accomplished a journey which had scarcely ever been surpassed. The result of the expedition was to show that nothing could be hoped for from the central districts. However, on the boundary of the Telegraph Line of South Australia, and on the west coast after leaving Champion Bay in a north-easterly direction, there was a large quantity of good land, which was now being taken up, and afforded as fair a field for settlement as any other in the colony, if people would only go there with energy and capital, and indeed he believed West Australia might be made to surpass both South Australia and Queensland. In the neighbourhood of Champion Bay was the Murchison River, and a little south of that the Irwin. The whole of that country was one mass of minerals, and sooner or later must become very valuable. The district of Shark's Bay abounded in pearls, many thousand pounds' worth being sent to England annually. The shell, however, was not very valuable, the mother-of-pearl being so small; but further north, near Exmouth Gulf and Nicol Bay, the most magnificent pearls and pearl-shells were found. These were collected principally by Malays employed by colonists, the shell being worth upwards of 300*l.* a ton. The exports of West Australia had doubled during the last three years, and the imports had increased proportionately. When Sir G. Bowen went to Queensland he found only 7½*d.* in the coffers of the Treasury there; but West Australia, unlike Queensland, had but a small debt, the total amounting to only 135,000*l.*, and there was money enough in the colonial chest at the present time to pay off a very considerable portion of that sum if it was desirable to do so.

Mr. TOMKINSON said he had had the happiness on two occasions to assist in receiving Mr. Forrest on his arrival in South Australia after successfully accomplishing his wonderful journeys. Mr. Forrest had not done justice to his own merits, for he had not dilated upon the difficulties which he had to face, and which he overcame. As a South Australian, he (Mr. Tomkinson) could endorse all that Mr. Leake had stated with regard to the capabilities of West Australia, and Mr. Forrest merited any distinction which the Royal Geographical Society might think fit to confer upon him.

Mr. DAINTREE, referring to the desert sandstone which was so abundant in the districts traversed by Mr. Forrest, said he had seen the outliers of that sandstone throughout a large part of Queensland, and he was satisfied that during the Tertiary epoch almost the whole of that colony had been covered with it. Had it not been for the denudation caused by the rivers running east and north, there could be no doubt that at the present time it would still be a desert, similar to that passed over by Mr. Forrest.*

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* Mr. Daintree, having been interrupted by the entrance of the Sultan, has communicated the following continuation of his remarks:—

"In my paper on the Geology of Queensland, published in vol. xxviii. No. 111 of the Geological Society's Journal, at p. 275 I state that 'all the available evidence tends to show that this "Desert Sandstone" did at one time cover nearly, if not quite, the whole of Australia.' At p. 282, I again assert my belief that the Cretaceous system, such as forms the plains of the Flinders and Thompson in Western Queensland, extends throughout the whole of Central Queensland to Western Australia, *probably hidden, however, over large areas by desert sandstone.* The explorations of Messrs. Forrest and Warburton have proved that these prognostications were correct, but that comparatively small oases of the underlying

His Highness the Sultan of Zanzibar and suite, accompanied by the Rev. Dr. George Percy Badger, Dr. J. Kirk, H.B.M. Consul-General and Political Agent, Zanzibar, and Clement Hill, Esq., entered the hall amid the acclamations of the audience.

The visitors having taken their seats, the President spoke as follows:—

"I have now the pleasure of introducing to the Society the Sultan of Zanzibar. He has been an honoured guest everywhere in England, as you know, but in no place is he more welcome, I am sure, than in the Royal Geographical Society, he having been an Honorary Member of our Society for several years, and having also on all occasions, whenever an opportunity occurred, conferred upon us very essential service in forwarding geographical research. It was owing to his Highness's assistance that we were able to send our Relief and Search Expedition for Livingstone into the interior of Africa, and on every occasion he has shown the utmost good will and energy in assisting us. I would only further remind you, ladies and gentlemen, that the friendship of the Seyd's family with England is not a thing of yesterday. It was in the first year of this century that Sir John Malcolm made his first treaty with the grandfather of the present Sultan, and from that day to the present, throughout the long fifty years of his father's reign, the family

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Mesozoic rocks are anywhere exposed along the tracks followed by them. Mr. Forrest has examined the specimens of rock and photographic illustrations of the desert sandstone in the Queensland Museum at South Kensington, and was struck with the similarity of those passed over by him. I pointed out, in the geological paper before alluded to, that it was simply a matter of denudation as to what areas of rock other than desert sandstone would be found between Queensland and Western Australia, and therefore as to what areas would be found available for pastoral settlement, or what mineral areas might be exposed. The rich Cretaceous plains of the Flinders, the valuable mining districts of the Gilbert, Palmer, Charters, Towers, Ravenswood, and Cloncurry in Northern Queensland, are only now available by reason of the removal of the desert sandstone by meteoric influences. All are sharply bounded by cliffs of this inhospitable rock-system and its accompanying spinifex. But what I would wish especially to call attention to, is the fact that extensive lava-flows have taken place in Queensland subsequent to the desert-sandstone period; notably, the tract extending from the Upper Burdekin to the Upper Flinders, a strip 200 miles long by 80 broad, affording splendid pastoral country, well watered, and giving access to the Great Western Plains, which otherwise would have been almost inaccessible to the East Coast, on account of the spinifex and poison-plant everywhere found on the watershed between eastern and western waters. The hope of discovery of any available country between Forrest and Warburton's tracks, and between Warburton and the north-western coast range, must therefore rest on the possibility of the discovery of isolated tracts of volcanic country resting on the desert sandstone, for any extensive denudation seems out of the question; and perhaps the best clue to this would be examination of the native weapons which may have been collected on these expeditions, as the denser basalts are used for stone tomahawks by natives where better material is not to be obtained. Even were such tracts to be discovered, however, their isolation in such inhospitable country would be an insuperable bar to their profitable occupation; and there seems little doubt that Mr. Forrest's opinion is the correct one, that the country between the west and north-west coast range of Australia and the Overland Telegraph Line is useless for any purpose of settlement. Knowing the difficulties attached to travelling over this miserable desert country, which M'Kinlay says is fit only for 'black fellows and wallabi,' I can heartily endorse the opinion just expressed by Mr. Tomkinson, that Mr. Forrest fully merits any distinction to which an explorer who, after enduring great privations and hardships, has practically solved the problem of the physical character of the interior of Australia, is entitled."

has always behaved with the most unswerving loyalty to the British Government. His Highness has shown the utmost desire not only to further the political interests of England, but also to protect trade; and latterly, as you are aware, to facilitate the measures which we have thought it proper to introduce for the suppression of the slave trade. On all these grounds his Highness Seyd Burghash certainly deserves well of this country, and especially of the Society of which he is an Honorary Corresponding Member. And let it be remembered that the Geographical Society is, I believe, the only society in England which has the honour of having his Highness enrolled amongst its members. I had hoped that Sir Bartle Frere, who was lately sent out by her Majesty as Envoy to his Highness, would have been present; but as he has been unavoidably detained, I will ask General Rigby, who for many years was Political Resident at the Court of Zanzibar, briefly to point out upon the map the situation of that country and to give you in a few words the result of his experiences."

GENERAL RIGBY pointed out on the map the portion of East Africa ruled over by the Sultan of Zanzibar. He said that it entirely depended upon the good government of Zanzibar whether the interior of East Africa should be civilised, and its trade opened or not. The Zanzibar dominions extended from about 2¼° N. to 10½° S. A number of large rivers flowed through it, such as the Pangani, the Rufigi, the Juba, and others, and opened up communications with the interior. Probably there was no part of the world that had a richer soil or was better adapted for trade than the east coast of Africa, and it was entirely owing to his Highness Seyd Burghash and his predecessors that this country was now settled and comparatively civilised. Its trade was increasing and becoming of greater importance to Europe year by year. For many staple articles of trade Europe now depended almost entirely on the Zanzibar dominions. These dominions had the largest trade in ivory in the world; they supplied all the carriage-varnish gum-copal, of which there was an inexhaustible supply, and almost the entire supply of cloves in the world came from Zanzibar, although it was only recently that cloves had been grown there. Before they were cultivated there, cloves cost from 2*s.* to 4*s.* per pound, whereas now they could be bought for 4*d.* or 5*d.* Within the last ten or fifteen years a vastly increasing trade has sprung up in gums, spices, sugar, cotton, grain, and various other articles; in fact, there was no limit to the production of the Zanzibar dominions. His Highness Seyd Burghash had done all in his power to open up the country, and would still continue to do so, to his own benefit and the benefit of the world.

DR. BADGER then read the following translation of the reply to the President's greeting, which his Highness had placed in his hands:—

"Mr. President, my ladies, lords, and gentlemen,—

"Our gratification overflows at meeting this honourable assembly, and we thank you heartily for the generous welcome which you have given us, and which we ventured to anticipate from your famed courtesy. We have heard wonderful accounts of the proceedings of this Royal Society in all parts of the world; but we have also ourselves seen and known much, and learned more, from our beloved friend, John Kirk, of its explorations of Eastern and Central Africa, especially through their distinguished and indomitable explorers, Burton, Speke, Grant, Livingstone, Stanley, and Cameron, who braved many and great dangers in order to make known to the world what was before unknown respecting the land of the Great Lakes, and who have given us correct information of those parts which, albeit reckoned under our rule, we knew little of except by untrustworthy report. There can be no doubt that these researches will lead the way to many advantages, and will result in the eventual civilisation of those large districts, and the extension of commerce, to the benefit of all concerned. In our little way we have endeavoured to forward these researches in the midst of great difficulties, which have not always been appreciated. All we would now say is, that we have done what we could, and that by the aid of God in the first place, and next through emulation of what we have seen in this country, stimulated thereto also by what we see before us this evening, and particularly because we have been honoured by having been made a member of this Royal Society, we shall do our best, God helping us, to further its useful objects. Several Arabian poets have dilated on the advantages of travel; and since our arrival in England we have been convinced of the truth of their statements. This Society, by making generally known the peculiarities and productions of different countries, together with the habits and customs of their inhabitants, must contribute largely to the instruction, the pleasure, and the benefit of mankind at large. We desire once more to reciprocate your kindly greeting, and to express towards you all whatsoever good will and happiness you have expressed for us."

DR. KIRK, addressing the Meeting at the invitation of the President, said he could add but little to General Rigby's statement with regard to Zanzibar, but perhaps the Meeting might be anxious to know the latest accounts of the travellers who had gone into the interior. No positive information had been received for some time from either Mr. Stanley, or Lieutenant Cameron, but he had no doubt they were advancing safely. Mr. Stanley, when his last letters were dispatched, had reached Ugogo, and had gone to the north towards the Victoria Lake. Lieutenant Cameron, when last he was heard of, had reached, for the second time, the western shore of Tanganyika, whence he would follow up Dr. Livingstone's discoveries in the Manyuema country, and if possible pass down the Congo. From what was known of his character and the admirable way in which he had organised his expedition from Ujiji and conducted the circumnavigation of the lake, there was very little reason to doubt that he would accomplish his object. The Zanzibar mail had that day arrived, but no mention was made of the explorers in his Highness's letters, and his Highness therefore concluded that all was going well with them.

DR. BADGER said that his Highness desired him to say that all he had heard about Lieutenant Cameron went to show that he was received everywhere with great kindness by the people, and was making his way famously. Those who should hereafter be sent out by the Royal Geographical Society for the exploration of Eastern Africa would always receive his Highness's best assistance, for his wish was to consider England and his own dominions in Africa as one and the same country.

MR. F. O. MARTIN recommended that an attempt should be made to open up the internal communication of Eastern Africa by means of domesticated elephants, which he thought would greatly contribute to the civilisation of the country. That the African elephant could be domesticated, was proved by the fact that they had been used by Hannibal. He had learnt, upon the authority of Professor Owen, that in some parts of Africa, in order to get the ivory, the elephants were driven into the high grass, which was then set on fire and the animals burnt to death. He was sure that, when the existence of such a practice was made known to him, his Highness would do all that lay in his power to put an end to it.

Dr. BADGER said he had translated the remarks of the last speaker to His Highness, who said, "I should be extremely thankful to anybody who will come to Africa and show us the best way to catch and tame elephants."

The PRESIDENT announced that, with a view to the utilization of the Indian elephant in Central Africa, it had just been decided by the Indian Government to present six thoroughly trained animals to his Highness the Khedive of

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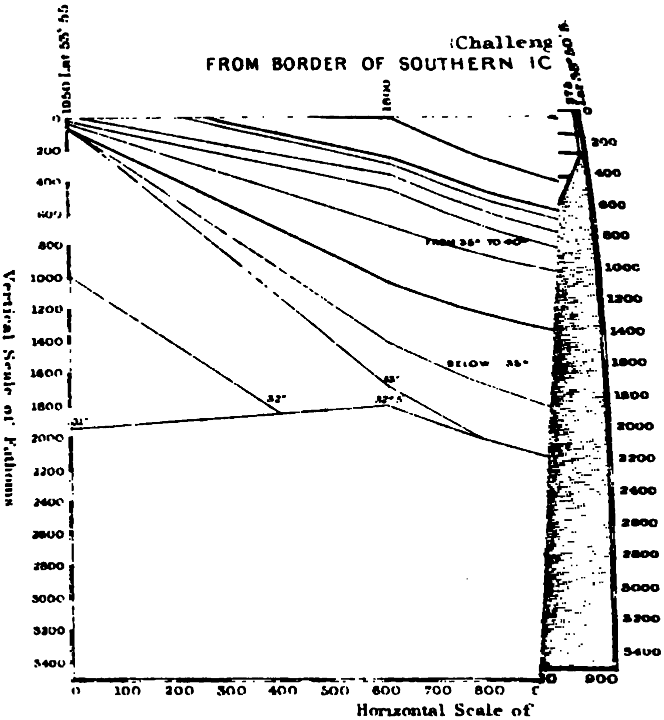

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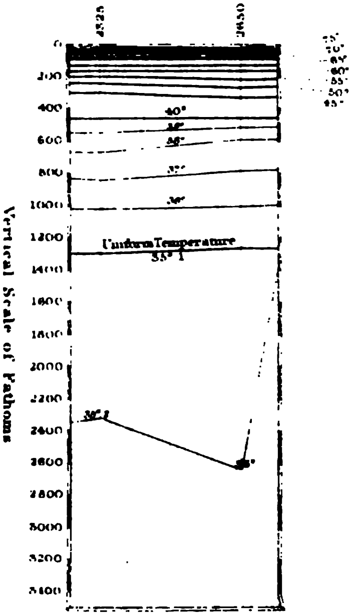

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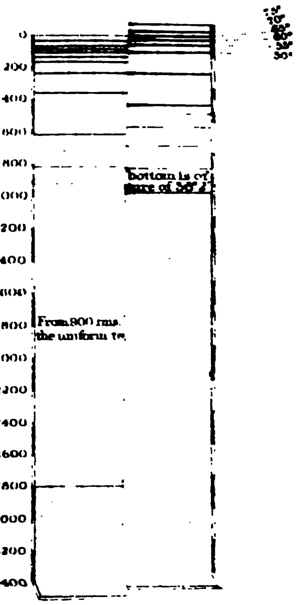

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Egypt, to be employed with Colonel Gordon's Expedition. It was hoped that by these means a way would be opened for the future domestication of the more docile Indian elephant in Central Africa.

His Highness the Sultan being about to leave the meeting,

The PRESIDENT said: "I now beg the Meeting by acclamation to allow me to present their best wishes to his Highness, and to thank him very much for having done us the honour of attending our meeting on this occasion, and to wish him God speed in his future journeys. He is about to leave London, and very shortly he will leave England; but I am sure he will carry with him the best wishes not only of the Royal Geographical Society, but of the English people, for his future success in the civilization of Eastern Africa."

His Highness and suite then retired; the audience all standing.

The following paper was then read by the author:—

2. *Summary of Recent Observations on Ocean Temperature made in H.M.S. 'Challenger,' and U.S.S. 'Tuscarora;' with their bearing on the Doctrine of a General Oceanic Circulation sustained by Difference of Temperature.* By WILLIAM B. CARPENTER, M.D., LL.D., Corresponding Member of the Institute of France.

INTRODUCTION.

THE Reports on Deep Sea Temperatures sent home from Sydney and Hong Kong by the 'Challenger' expedition, for copies of which I am indebted to the kindness of the Hydrographer to the Admiralty, afford additional data of much interest in their bearing on the doctrine of a General Oceanic Circulation, which I have been permitted on two previous occasions to bring before the Royal Geographical Society. And as I find in these new facts a very decided confirmation of that doctrine, I venture to believe that a concise exposition of them will not be unacceptable.

I have been further enabled, by the kindness of the Hydrographer, to acquaint myself with the results of the Temperature-observations recently taken in the North Pacific by the U.S.S. 'Tuscarora.' Of these results, obtained in an entirely new field of enquiry, some, being in complete and obvious accordance with the doctrine, afford a further confirmation of it, whilst others appear at first sight inconsistent with it. I propose, therefore, to present a summary of the whole series, and then to enquire whether the apparently antagonistic facts are not capable of being fairly explained in a manner quite consistent with the doctrine which the others support. The correctness of the *rationale* I shall offer will probably be tested by the more complete enquiries now being carried on by the 'Challenger' in the North Pacific, and by the extension of its researches to the South Pacific.

I. Voyage of the 'Challenger.'

1. *Southern Indian Ocean.*—Leaving the Cape of Good Hope on the 17th December, 1873, the 'Challenger' proceeded S.E. towards Marion Island, thence E. to the Crozets, and then E. by S. to Kerguelen's Land; thus traversing, between the parallels of 36° and 50° S. Lat., an ocean which, like the South Atlantic, is in free communication with the Antarctic area.

2. The first serial sounding, taken soon after leaving Cape Town, in Lat. 36° 48′ S., Long. 19° 24′ E., showed in a very marked degree the influence of the Agulhas current, which may be considered as an extension of the Equatorial Current of the Indian Ocean, slanted to the S.W. by the coast-line of South Africa. This current was found to be setting W.S.W. at a rate of 1½ mile per hour; and the temperature of its surface-layer, down to 20 fathoms was 73°, whilst as far down as 70 fathoms the water was warmer than the surface-water in a corresponding latitude to the westward of the Cape. Beneath this to 400 fathoms, at which the temperature was 40°·6, the thermal stratification (Table, No. I.) was nearly the same as in the South Atlantic; and the bottom-temperature at 1900 fathoms was 34°·5, which is about the same as that of the South Atlantic at the like depth.

Serial Temperatures taken by the 'Challenger' in the Southern Ocean.

Lat. S.	Long. E.	Surface.	50 fathoms.	100 fathoms.	200 fathoms.	300 fathoms.	400 fathoms.	600 fathoms.	Bottom.	
									Depth.	Temp.
° ′	° ′	°	°	°	°	°	°	°	Faths.	°
I. 36 48	19 24	73·0	59·5	52·2	46·1	42·9	40·6	..	1900	34·5
II. 45 57	34 39	43·0	..	41·5	38·4	37·9	36·6	37·0	1570	35·0
III. 46 16	48 27	41·0	40·0	37·1	37·0	..	36·1	35·9	1600	33·3
IV. 52 4	71 22	37·5	36·5	35·0	..	..	..	..	150	35·2

3. The excess of surface-warmth was found to continue during a run of 230 miles to the S.S.E., and then suddenly disappeared; the temperature of the surface falling rapidly, until at a distance of 120 miles to the west of Marion Island (Lat. 45° 57′ S., Long. 34° 39′ E.), on the 24th of December—the midsummer of the Southern hemisphere—it was only 43° (Table, No. II.), descending to 41°·5 at 100 fathoms, to 38°·4 at 200 fathoms, and to 36°·6 at 400 fathoms. The temperature of the bottom at 1570 fathoms was 35°, agreeing with that of the South Atlantic at the same depth. On the 30th December, at 86 miles west of the Crozets (Lat. 46° 16′ S., Long. 48° 27′ E.), the temperature of the surface was

only 41°, descending regularly to 37·1° at 100 fathoms, and thence gradually to 33·3° on the bottom at 1600 fathoms (Table, No. III.).

4. The month of January was spent in an examination of Kerguelen's Land and Heard Island, with a view to their suitableness as stations for Transit observations. Of the climate of Kerguelen's Land (Lat. 50° S.) in the midsummer of the Southern hemisphere, Captain Nares says: "The weather experienced during "our stay may be well compared with that of England in the "winter; but in the more favoured parts the sky is more fre"quently clear than it is at that season." "The thermometer, stand"ing generally at 42° or 44°, ranged between 38° and 58°; the "highest reading accompanies the strongest wind from the north, "the lowest, fine weather with westerly winds." "On the N.W. "exposed side of Kerguelen, there is a glacier extending low down "the hills; but on the sheltered east side the continuous winter "snow-line is upwards of 1000 feet above the sea, and during the "summer the tops of all the hills are free from snow or ice, which "is only seen on the sides in sheltered situations. It seldom freezes "at the level of the sea, even in winter." Heard Island, which lies to the S.E. of Kerguelen's Land, near the parallel of 53°, is said by Captain Nares "to consist of two enormous glaciers, the "spurs of which even in summer extend down to the beach on "both sides of the island, while during the four winter months the "sealers have to obtain water by melting the frozen snow. The "temperature during our short stay ranged between 39° and 36°, "which is the same as the temperature of the surface-water, "and therefore a correct indication of the mean for the time "of the year." In a Temperature-sounding taken between Kerguelen's Land and Heard Island (Table, No. IV.) on the 2nd of February, the surface-temperature being 37°·5, the thermometer sank to 36°·5 at 50 fathoms, and to 35° at 100 fathoms.

5. Thus the surface-temperature of the Southern Indian Ocean in summer is 18° or 20° below that of the North Atlantic under the same parallels; but there is not by any means the same difference in winter, the southern isotherm of 41° (5° Cent.) shifting only about 3° nearer the Equator, while the corresponding northern isotherm moves at least 10° to the south. On the other hand, the surface-temperature of the Southern Indian Ocean seems to correspond very closely, alike in summer and in winter, with that of the South Atlantic under the same parallels.* I pointed out in my last paper ('Further Inquiries,' § 98) that the lower

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* See 'Onderzoekingen mit den Zeethermometer,' published by the 'Koninkl

temperature of the South Atlantic is not confined to the surface, but extends through the sub-surface stratum; and in particular that the isotherm of 40°, which near the Faroe Islands (Lat. 59° 30′ N.) lies at a depth of about 700 fathoms, scarcely reaches half that depth in any part of the South Atlantic. Now, whilst arguing (§ 115) that it is scarcely conceivable that the influence of the true Gulf Stream or Florida Current can propel towards the North Pole a stratum of this depth, and of a breadth of 1700 miles, I did not offer the very simple explanation of this marked excess in the thickness of the warm sub-surface stratum in the North Atlantic, which has since occurred to me.

6. Let us suppose the Arctic indraught to extend to a stratum of water 300 fathoms deep under the tropic of Cancer, where the breadth of the Atlantic basin is about 3600 miles; as this stratum moves northwards, its channel is progressively narrowed, until between the British Islands and Newfoundland it is reduced to about 1700 miles; and it must, therefore, have its thickness proportionally *increased*, displacing colder water by its downward pressure. On the other hand, the corresponding stratum to which the Antarctic indraught imparts motion from the Tropic of Capricorn towards the South Pole, will be continually widening out as it flows between the receding coasts of Southern Africa and South America, and will therefore be constantly *diminishing* in thickness. And the same will obviously be the case with the warm sub-surface stratum of the Southern Indian Ocean, when no longer confined between the boundaries formed by South Africa and Western Australia.

7. Now, as I formerly showed ('Further Inquiries,' § 122), the temperature of the surface in high latitudes is far more influenced by the thickness of the moderately-warm sub-surface stratum, than it can be by any elevation in the temperature of a thin surface-layer, which is liable to speedy reduction under the influence of a low atmospheric temperature; and I am disposed, therefore, to regard the low surface-temperature of the Southern Indian and South Atlantic Oceans, with the depressing influence it exerts on the climate of the small islands scattered through those oceans, and on the position of the Antarctic ice-barrier, as mainly due to the lateral extension, and consequent thinning-out, of the Poleward upper-flow; while the relatively high temperature of the North Atlantic under the same parallels, with the amelioration it produces in the climate of the British Islands, the Faroes, the coast of Norway, &c., seems to me mainly attributable to the lateral compression, and consequent increase in depth, of the Poleward upperflow,

which further carries with it an excess of temperature imparted by the Gulf Stream to the Mid-Atlantic, in which it loses itself.

8. *Antarctic Ocean.*—From Kerguelen's Land the 'Challenger' proceeded southwards, with the purpose of sounding and dredging on the border of the Antarctic ice-barrier. After passing numerous icebergs, she entered the pack in Lat. 65° 30′ S.; and on the 18th February a sounding was taken in Lat. 65° 42′ S. and Long. 79° 49′ E. The result of this sounding, and of others taken in the immediate neighbourhood of the ice, showed that, as I had anticipated, the superficial stratum was cooled down, by the melting either of the pack-ice or of icebergs, several degrees below the subjacent stratum, on which it floated in virtue of its reduced salinity. At the edge of the pack-ice the temperature of the surface-water was always between 28° and 29°, just sufficiently warm to melt salt-water ice very slowly; while at a short distance from the pack the temperature of the surface water was found to be 32°, coming down, however, to 29° at a depth of about 40 fathoms, and continuing at that point down to about 300 fathoms, the depth in which most of the icebergs float. Below this there is a stratum of water having a temperature of 33° or 34°; and beneath this, again, is a deep stratum of glacial water, the temperature of which could not be determined with the ordinary minimum thermometers, as they had to pass through a colder stratum above. Captain Nares is of opinion, from observations taken in lower latitudes, that the bottom-temperature would be 31°; but as I have myself met with a bottom-temperature of 29°·5 in the Faroe Channel, I am inclined to think that 29° would be nearer the mark.* The notion that in Polar seas the temperature goes on increasing with depth until it reaches 39°, may now be regarded as finally disposed of. It seems to have arisen from the effect of pressure on the thermometers used in the observations of D'Urville and Sir James Ross.

9. Now it is clear that the warmth of the sub-surface stratum cannot be derived from any local source. "While in the neighbourhood of the ice," says Captain Nares, "between the 13th and " 25th February, the temperature of the air ranged between 34°·8 " and 21°·5, the mean being 31°·5; a slightly colder climate in an " average latitude of 64° S. than is found in the month of August

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* The new self-registering thermometer devised by Messrs. Negretti and Zambra will enable the temperature of any stratum of the Ocean water to be precisely determined; and as the Arctic Expedition has been supplied with several of these instruments, it may be hoped that an accurate determination may be made of the winter temperature of the water beneath the ice, from the *surface to the bottom.*

" in the Arctic seas in latitude 74° N." Any excess of atmospheric warmth must have been entirely expended in melting the ice on the surface; and this, as just shown, will tend to keep down the surface-temperature of the sea. In winter the surface-temperature will be always undergoing reduction from the cooling influence of the atmosphere above. Hence, the stratum having a temperature between (say) 30° and 34°, must have come from a lower latitude; and Captain Nares regards it as "evidently the continuation " towards the cold regions of the main oceanic flow of water." As there is no question of any "Gulf Stream" in the Antarctic area, I venture to think that the presence of this warm underlying stratum affords conclusive evidence of that general Poleward movement of the upper stratum of oceanic water, which I have contended for as a necessary result of the indraught produced by the downward movement maintained in the Polar area by the effect of surface-cold. The interruption to this downward movement under the conditions just described, is, of course, purely local and temporary, being limited to the margin of the ice-region and to the brief summer season.

10. From the border of the Antarctic ice-region, the 'Challenger's' course was directed N.E., towards Melbourne; and the Temperature-section (No. I.) obtained between a position in Lat. 53° 55′ S., Long. 108° 35′ E., and Cape Otway, Lat. 38° 53′ S., and Long. 143° 37′ E., is particularly instructive. In the sounding taken on the 3rd March at the former position, from a surface-temperature of 37°·2, there was a gradational reduction to 36°·6 at 60 fathoms, and then a sudden reduction to 33° at 70 fathoms, from which point to the bottom at 1950 fathoms there was only a further reduction of 2°, the bottom-temperature being 31°. From this position, however, the bathymetrical isotherms descend so rapidly, that at the next sounding, taken March 7th, in Lat. 50° 1′ S., Long. 123° 4′ E., the surface-temperature being 45°, the isotherm of 40° was found to lie at the depth of about 250 fathoms, and the isotherm of 35° at about 1000, the bottom-temperature at 1800 fathoms being 32°·5. In another sounding taken March 10th, in Lat. 47° 25′ S., Long. 130° 22′ E., the surface-temperature having risen to 51°·5, the isotherm of 45° was found to have sunk to about 450 fathoms, the isotherm of 40° to about 600, and the isotherm of 35° to about 1350, the bottom-temperature at 2150 fathoms being 33°·3. The same conditions, with an increase of surface-temperature obviously due to the superheating of the superficial stratum, continued to present themselves as the Australian coast was approached. Comparing this section with those of the Southern Indian Ocean and the South Atlantic under nearly the same

parallels, we notice the much greater thickness of the stratum above the isotherm of 40°; and this excess is particularly remarkable in the stratum between 45° and 50°, which thus corresponds with the stratum between 55° and 60° in the western portion of the North Atlantic under corresponding parallels. I am disposed to regard it as due to an extension of the "East Australian Current," which is the southward prolongation of the southern portion of the Pacific Equatorial.

11. *South Pacific.*—As the 'Challenger' proceeded northwards to Sydney (Lat. 33° 54′ S.), while the surface-temperature rose to above 70°, the cold understratum was found to rise nearer to the surface; the isotherm of 40° (as shown in Sect. II.) there lying at about 400 fathoms, and the descent of the thermometer to this point being nearly uniform. But in the voyage from Sydney to Cook's Strait, New Zealand (Lat. 41° 7′ S.), while the surface-temperature gradually fell with the increase of distance from the Equator, the isotherm of 40° again deepened to more than 700 fathoms (Sect. II.), the stratification above it being very uniform. Again, in proceeding thence nearly due north to the Fiji islands, which lie in Lat. 15° S., with the progressive elevation of the surface-temperature to 70°, the isotherm of 40° again rose to within 450 fathoms of the surface. Taking these facts in connection with the marked peculiarity of the thermal stratification of the Equatorial Atlantic, to which I drew attention last year ('Further Inquiries,' §§ 94, 95), I think it may now be stated with some confidence, that *the lightening of the upper stratum by elevation of its temperature tends to favour the ascent of cold water from the bottom,*—which is precisely what theory would lead us to anticipate.

12. *Eastern Archipelago.*—The soundings subsequently taken by the 'Challenger' in different parts of the Eastern Archipelago afford a remarkable confirmation of the doctrine formerly advanced ('Further Inquiries,' §§ 74, 75), that wherever any area is cut off, by a deep ridge, from the General Oceanic Circulation, the temperature, instead of sinking further with that of the basin outside, will remain constant at the point to which it sinks on the plane of the ridge, whatever may be the depth of the bottom. Thus, in proceeding from New Zealand to the Fiji islands, a sounding taken in Lat. 25° 5′ S., Long. 172° 56′ W., gave 32°·9 as the bottom-temperature at 2900 fathoms. But in proceeding westwards from the Fiji islands through the Melanesian Sea (Sect. III.) towards Raine Island at the entrance of Torres Strait, it was found that although the depth ranged from 1350 to 2650 fathoms, the temperature never fell below the 35°·1 which was reached at 1300 fathoms,

"which proves undoubtedly," says Captain Nares, "that below "that depth this sea is cut off by a surrounding ridge, over which "the greatest depth of water of any channel through it is 1300 "fathoms. As this is about the depth we found between the New "Hebrides and the Fiji islands, we may take it for granted that "from Sandy Cape, in Australia, to New Caledonia, the New "Hebrides, the Solomon Islands, and New Guinea, there is a "shallow bank with not more than 1300 fathoms' depth of water. "Below this depth, in the hollow between the New Hebrides and "Torres Strait, the water is comparatively stagnant, as in the "Mediterranean and other cut-off seas."

13. In the Banda Sea, lying within 5° of the Equator, the thermometer fell progressively to 37°·5 at 900 fathoms, and remained the same to the bottom at 2800 fathoms (Sect. IV.). This sea communicates with the Pacific only by a series of narrow channels; and its temperature is probably governed by that of the Arafura Sea to the south of it, which in its turn is dominated by that of the Indian Ocean. It is clear that some barrier exists, preventing the entrance of glacial water at a greater depth than about 900 fathoms; and the effect of this is marked in the depression of the isotherm of 40°, which, rising in the Equatorial Atlantic to within 300 fathoms of the surface, here lies at 600—presumably because the obstruction to the general oceanic circulation produced by the partial enclosure of this sea interferes alike with the draughting-off of the surface water, and with the uprising of glacial water from beneath to replace it.

14. Similar conditions obtain in the Celebes and the China Seas, which are cut off from communication with the Indian Ocean by shallow straits, and whose communication with the Pacific Ocean appears to be interrupted by deep ridges. For in the Celebes Sea (Sect. V.) which lies still nearer the Equator than the Banda Sea, the thermometer descends, in the first instance, at almost precisely the same rate, reaching 38°·5 at a depth of 700 fathoms; whilst from that plane down to the bottom at 2600 fathoms, it shows no further reduction of temperature. And in the China Sea (Sect. VII.), in which the mean latitude of the portion connected with the Pacific is 20° 30′ N., although the surface-temperature falls with increased distance from the Equator, the descent of the thermometer through the sub-surface stratum follows the same rate, 45° being reached in both seas at 300 fathoms, 40° in 500 fathoms, and 36°·2 at 900 fathoms, from which plane the temperature continues uniform to the bottom at 1050 fathoms. Hence it may be concluded that the ridge separating the Celebes Sea from the Pacific lies at the depth

of about 700 fathoms; and that the China Sea is separated from the Pacific by a ridge of about 900 fathoms' depth.

15. The Sulu Sea, to which I formerly adverted as a very marked case of this kind, has been again examined very carefully by Captain Nares, in its relations both to the China and to the Celebes Seas; and the contrast which its temperature-stratification (Sect. VI.) presents to theirs is extremely curious and instructive. From 82° at the surface, the thermometer falls rapidly to 60°; but the isotherm of 55° lies at about the same depth as the isotherm of 50° in the Celebes and China Seas; and below this the reduction of temperature is still slower, so that the minimum of 50°·5 is only reached at 400 fathoms, from which depth down to the bottom, at 2550 fathoms, the thermometer continues to show 50°·5. Hence the condition of this sea closely resembles that of the Mediterranean. Only its upper stratum can be in communication with the outside ocean; for from both the Celebes and the China Seas it would receive water below 50° at any depth exceeding 200 fathoms; and the absence of such water shows that it must be excluded on either hand by a ridge of about that depth. The persistence of a temperature above 50°·5 to a depth of 400 fathoms, the isotherm of 50° lying both in the Celebes and the China Seas within 200 fathoms of the surface, may be fairly attributed to the want of any uprising of cold water from beneath, antagonizing the downward convection of heat from the surface by the descent of the films concentrated by evaporation.

16. The most remarkable soundings taken by the 'Challenger' in these seas were those obtained in Lat. 11° 24′ N., Long. 143° 16′ E., not more than 850 miles from the coast of New Guinea. These gave depths of 4475 and 4575 fathoms; and the only one of the four thermometers sent down, which withstood the tremendous pressure of nearly six tons on the square inch, recorded a bottom temperature of 34°·5. As this temperature was also recorded at a depth of 1500 fathoms, there was here a stratum of 3000 fathoms in thickness having a uniform temperature of 34°·5; which is obviously the temperature of the coldest water that can find its way into this extraordinary depression. Thus we see that the temperature of any sea-bottom will depend upon the depth at which its area communicates with some other, over which the glacial underflow streams without interruption from one of the Polar basins. It cannot be doubted that if the sub-marine ridges which at present cut off only the deeper portions of the Banda, Celebes, and China Seas, from the Pacific Ocean, were to be progressively raised from 900 to 200 fathoms, the temperature of the whole mass of included

water would also rise, keeping pace with that of the oceanic stratum on the plane of the ridge, until it should come to equal that of the Sulu Sea.

II. VOYAGE OF THE 'TUSCARORA.'

17. The 'Tuscarora' was sent out by the United States Government, not with a view to scientific research, but for the purpose of determining by deep-sea sounding the most practicable route for a sub-marine cable between the Pacific sea-board of the United States and Japan. In addition to ordinary bathymetrical determinations, bottom-temperatures were everywhere taken with "protected" thermometers; and the thermal stratification down to about 600 fathoms was also systematically determined by serial soundings. A very important body of facts has been thus collected in regard to the thermal condition of the North Pacific along the two lines examined;—viz., the Southern route, passing directly across between the parallels of 20° and 30° N. Lat., from San Diego in California, by way of the Sandwich Islands, to the Bonin Islands, and thence northward to Yokohama; whilst the Northern route followed a great-circle-course from Yokohama along the line of the Kurile and Aleutian islands to Cape Flattery, the northernmost point of the U.S. territory. Before discussing these results, it will be desirable to call to mind the important difference which exists between the North Pacific and the North Atlantic, in regard to their respective communications with the Arctic basin.

18. The North Atlantic, it will be remembered, receives a glacial underflow through the deep channel between the Shetlands and the Faroes; and there can be no reasonable doubt that a much more voluminous glacial flow comes down through the much wider and deeper channel between Greenland and Iceland. A further contribution will also be received from Baffin's Bay; but the channel between Iceland and the Faroes is barred by a bank at less than 300 fathoms' depth. This glacial underflow has as its complement the upper-flow of warmer water that is drawn towards the Polar basin by the continual descent of the water whose specific gravity is augmented by the extreme reduction of temperature to which it is there subjected. But whilst the South Pacific is in perfectly free communication with the Antarctic area, the North Pacific has no other communication with the Arctic basin than that which is afforded by Behring's Strait, the greatest depth of which is only 32 fathoms. Hence it is clear that it can receive no glacial water from the Arctic basin; and that the temperature of its sea-bed must depend in part upon the action of atmospheric cold upon the

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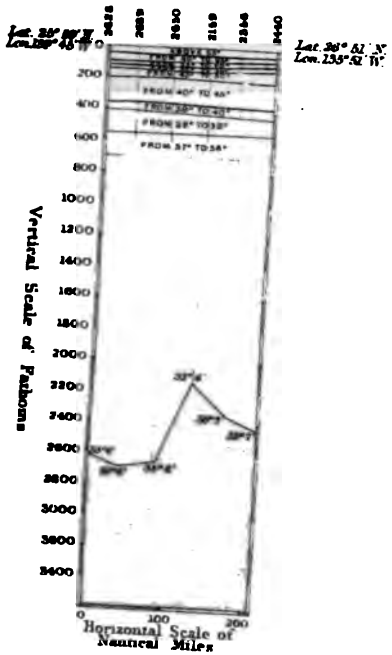
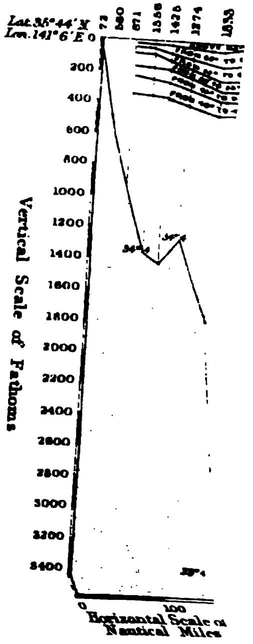
N°VIII

(Tuscarora)
EAST OF SANDWICH Ids



(Tuscarora)
COAST OF JAP



most northerly portion of its own surface, and in part upon the extension of the glacial underflow from the Antarctic area. Now, as a very small part of the Pacific lies to the north of the parallel of 50°, and as a considerable portion of this is cut off from free communication with the general basin by the peninsula of Alaska and the Aleutian Islands, and is, moreover, artificially warmed by the Japan Current, the influence of surface-cold cannot be considerable, and may, I think, be disregarded. On the other hand, the very great depth of the North Pacific basin specially favours the extension of the Antarctic underflow over its bottom; and the temperature-soundings taken by the 'Tuscarora' seem to me to leave no doubt that this underflow extends as far as the Aleutian islands, and probably passes between them into Behring's Sea.

19. *Temperature of the North Pacific Ocean.*—The Temperature-sections (Nos. VIII., IX., X.), taken in different parts of the Southern route, show a remarkable uniformity (1) in the position of the isotherm of 40°, which almost everywhere lies at between 400 and 450 fathoms from the surface, and (2) in the bottom-temperature, which on the ordinary bottom is everywhere about 33°·5, and even on the elevations (of which the highest lies at 1100 fathoms' depth) is below 35°. The surface-temperature rose, in passing from San Diego, in Lat. 32° 30′ N., to Honolulu, in Lat. 21° 30′ N., from 58° to 74° (part of this elevation being due to the advance of the season); and along the course from Honolulu to the Bonin Islands (Lat. 27° 40′ N.), in which the lowest latitude was 20° 12′ N., the surface-temperatures recorded (in the early part of April) ranged between 70° and 76°, thus corresponding to the surface-temperature of the North Atlantic in the same month, and between the same parallels.[*] There is noticeable in the Table of Serial Soundings taken along this line, a decided increase in the temperature of the sub-surface stratum in passing from W. to E.; for between Long. 158° 31′ W. and Long. 146° 10′ E.—a distance of 55° 19′—the thermometer rose at 150 fathoms from 55°·8 to 62°·6, at 200 fathoms from 49°·1 to 60°·3, at 250 fathoms from 45°·3 to 57°·1, and at 300 fathoms from 42°·8 to 51°·3. At 400 fathoms, however, there was only an elevation of 2°, and at 500 fathoms there was no perceptible difference, the isotherm of 40° keeping between these two planes. The cause of this increase in the temperature of the upper stratum appears to me to lie in the resistance afforded by the western boundary of the North Pacific basin to the onward movement of the superficial stratum that is propelled westwards by the Equa-

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[*] See 'Currents and Surface-Temperature of the North Atlantic Ocean,' published under the authority of the Meteorological Department.

torial drift; by which resistance the warm surface-stratum is made to displace colder water below. We shall presently see that the Japan Current, which is the northward continuation of the Pacific Equatorial, is distinguished from the ordinary water of the North Pacific, not only by its higher surface-temperature, but by the warmth of its sub-surface stratum.

20. As the 'Tuscarora' proceeded northwards from the Bonin Islands to Yokohama (Lat. 35° 15′ N.) during the month of April, the surface-temperature fell to between 69° and 63°; but the temperatures at 200 and 300 fathoms underwent very little reduction; and it was in the part of the Section farthest from the Equator—that, namely (Sect. X.), which approaches Yokohama—that the isotherm of 40° lies at its greatest depth (about 500 fathoms) beneath the surface; the total thickness of the *five* strata of 5° each between 65° and 40° here considerably exceeding that of the *seven* strata between 75° and 40° encountered in Lat. 20° 12′ (Sect. IX.).

21. The Temperature-soundings of the 'Tuscarora' in this part of the Pacific thus accord with those taken by the 'Challenger' in the Equatorial Atlantic and in the Eastern Seas, in showing that *normal*[*] *elevation of surface-temperature produces a rise of the bathymetrical isotherm of* 40°, that is to say, *brings the cold understratum nearer the surface*—which is precisely what the theory of a Thermal Circulation would lead us to predict. And they further make it clear that, as in the Tropical Atlantic, to which the Antarctic underflow extends, the whole of the vast mass of water that lies between the isotherm of 40° at from 400 to 500 fathoms, and a bottom whose depth often exceeds 3000 fathoms, has a temperature ranging downwards from 40° to 33°·2.

22. I stated in my last Paper ('Further Inquiries,' § 105), on the authority of Captain St. John, that the warm Japan Current seems to be separated from the coast-line by a colder band, analogous to that which intervenes between the Gulf Stream and the U.S. seaboard. Of this we here find the first indication in a sudden fall of surface-temperature from 68° to 60° as the 'Tuscarora' approached Yokohama; and the first Temperature-section taken along the northern route (Sect XI.) to the N.E. of Cape No Sima seems to indicate that—as along the U.S. sea-board—there is a surging-up of the deeper and colder stratum on the western border of this oceanic basin; the isotherm of 40° rapidly sloping upwards from 500 to 350 fathoms, as the bottom shallows from 1833 fathoms to 871. When the 'Tuscarora' left the land, the warmth of the sub-surface stratum

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[*] By this term I mean an elevation produced by direct insolation, and not by warm currents.

was found again to increase; the temperatures in the 3427 fathoms' sounding (Lat. 37° 54′ N., Long. 143° 40′ E.) being 68°·2 at the surface, 62°·3 at 100 fathoms, 57°·9 at 200 fathoms, 50° at 300 fathoms, 42°·5 at 400 fathoms, and 39°·5 at 500 fathoms, from which plane to the bottom at 33°·4 the reduction was probably slowly gradational, the isotherm of 35° appearing to lie at about 1000 fathoms.

23. The 'Tuscarora's' course having been then directed northwards and slightly to the west, so as to approach the northern extremity of Niphon, the warmth of the sub-surface stratum again diminished (Sect. XII.); so that in the 1358 fathoms' sounding, with a surface-temperature of 69°·1, the isotherm of 40° came up to within 300 fathoms of the surface; while in the 1017 fathoms' sounding (Lat. 39° 36′, N. Long. 142° 41′ E.), taken at not more than 40 miles' distance from the shore, the surface-temperature fell to 55°·6, and the isotherm of 40° rose to within 100 fathoms of the surface—thus still more distinctly evidencing the existence of the 'cold band.'

24. Proceeding thence in a N.E. direction, the 'Tuscarora' seems again to have entered the Japan Current; the surface-temperature rising to 60°·3, and the isotherm of 40° sinking in the 2856 fathoms' sounding (Sect. XII.) to between 150 and 200 fathoms: but this warm stratum was soon crossed; and as the 'Tuscarora' kept along the outer side of the chain of Kurile islands, passed the south end of the peninsula of Kamschatka, and then proceeded eastwards toward the Aleutian islands, she may be considered to have encountered the normal climate of the north-west Pacific. This climate is a most extraordinary one, as will be seen by the following table of temperatures taken between Lat. 43° 21′ N., and Lat. 52° 14′ N., during the months of June and July:—

N. Lat.		E. Long.		Surface.	30 fathoms.	50 fathoms	100 fathoms.	200 fathoms.	300 fathoms.	500 fathoms.	Bottom.	
											Depth.	Temp.
°	′	°	′	°	°	°	°	°	°	°	Faths.	°
I. 43	21	149	12	43·0	33·6	33·3	33·5	..	33·2	33·6	4041	..
II. 46	00	150	45	37·1	..	33·9	32·9	32·9	..	..	881	..
III. 48	40	156	07	41·9	32·1	32·5	32·2	32·6	..	..	2631	32·0
IV. 51	39	164	30	45·0	34·8	34·1	35·3	34·6	34·6	34·7	2934	..
V. 52	14	173	14	45·9	41·5	39·2	38·3	..	..	37·1	2463	..
VI. 51	08	178	35	47·0	41·9	41·0	39·4	37·8	..	..	1779	34·3

25. In the first of these soundings, taken almost exactly in the *parallel of* Bayonne, the summer temperature of the surface being

only 43°, water below 35° was met with at less than 20 fathoms' depth, and water of 33°·3 from 50 fathoms downwards; the thermometers sent to the bottom, which lay at the extraordinary depth of 4041 fathoms, were lost by the breaking of the sounding-wire. The second sounding, taken nearer land, seems to show in its low surface-temperature the influence of the "cold band;" but the sub-surface temperatures are nearly the same—as they are also in the third sounding, taken in the parallel of Brest, in which the surface-temperature had risen again to nearly 42°, while the temperature of the bottom at 2631 fathoms was 32°. In the fourth of these soundings, taken on the border of Behring's Sea, nearly in the parallel of Cork, it is to be noted that, notwithstanding 3° of northing, not only the temperature of the surface, but that of the sub-surface stratum, shows a distinct elevation; and this elevation—shown yet more decidedly, as regards the sub-surface stratum, in the fifth and sixth soundings which were taken in nearly the same parallel much further eastwards—is probably due in great part to the influence of the Japan Current, which, like the Gulf Stream, must possess an excess of easterly momentum that will carry it towards the north-eastern recess of the Pacific. Even here, however, the isotherm of 40° lies at a depth of scarcely more than 50 fathoms; but the reduction of temperature beneath is much slower, a temperature exceeding 37° being carried down to several hundred fathoms; and this seems related to a slight elevation of bottom temperature, which, along the latter part of this line, never sinks below 34°.

26. Entering Behring's Sea, and keeping to the north of the Aleutian Islands between the parallels of 52° and 54° 23′, the 'Tuscarora' experienced a decided rise of surface-temperature, its range being (with one exception) between 46°·2 and 49°·1; and while the bathymetrical isotherm of 40° nowhere approached within 40 fathoms of the surface, the reduction of temperature below this was very gradual, the thermometer at 100 and 200 fathoms showing an average of 38°·5, at 300 fathoms 37°·5, at 400 fathoms 37°, at 500 fathoms 36°·7, and the bottom-temperatures ranging between 35°·5 at 1006 fathoms and 34° at 1548 fathoms.

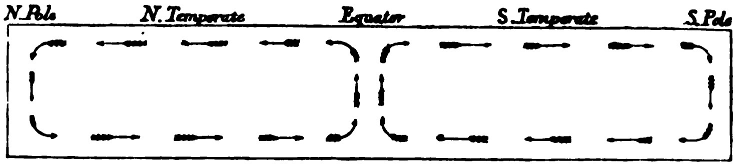
27. As the 'Tuscarora' passed out again into the North Pacific near the Alaskan Peninsula, the temperature of the surface-water suddenly rose from 49°·1 to 54°·4; and this elevation continued as she kept her course nearly due east, close to the parallel of 54° N., during the early part of August, and increased to 58°·5 as her great-circle-course carried her southwards into the latitude of 52°·36′ N. If this elevation was in any degree due to the extension of the Japan Current along the southern side of the Aleutian Islands and the Alaskan Peninsula, the influence of that current must have been

very slight, for it did not extend to 40 fathoms' depth, the isotherm of 40° still lying at between 40 and 50 fathoms. And since a temperature-sounding, taken in Lat. 53° 58′ N., Long. 153° W. on the 30th of September in the preceding year, gave only 50°·5 as the temperature of the surface, 38°·4 at 30 fathoms, and 37° at from 50 to 200 fathoms, it seems probable that the elevation of surface-temperature to 58°·5 was due rather to the direct insolation of July and August.

28. The peculiar feature of the temperature-stratification of the North Pacific, therefore, is the general want of that sub-surface stratum of above 40°, which, in the North Atlantic, under the same or yet higher parallels has been shown to have a thickness of at least 500 fathoms; the only part in which such a stratum presents itself, being that which is influenced by the Japan Current derived from the Pacific Equatorial. Now, at first sight it might be supposed that this would afford a powerful argument in favour of the doctrine that the elevated temperature of this stratum in the North Atlantic is due to the Florida Current or true Gulf Stream. But, as I pointed out on a former occasion ('Further Inquiries,' § 121), the north-easterly movement of the whole breadth of the Atlantic between the British Islands and Newfoundland is a phenomenon far too large to be accounted for by the propulsive force of what is a mere rivulet in comparison; and if the gathering together of its waters in the *cul de sac* of the Northern Atlantic, which is regarded by Professor Wyville Thomson as producing their downward displacement of colder water, were its *vera causa*, much more ought that effect to be produced in the North Pacific by the Japan Current, which has no northern outlet at all, save the narrow and shallow Strait of Behring.

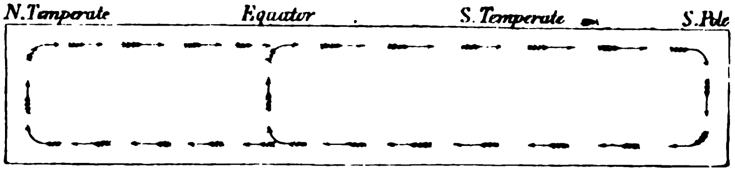
29. A *vera causa* for this peculiarity may be found, as it appears to me, in the *reversal* of that tractive force, which, on the doctrine of the General Oceanic Circulation sustained by difference of Temperature, gives a Poleward movement to the superficial portion of the contents of the great oceanic basins in communication with the Polar areas of their own hemispheres, and which thus, alike in the North and in the South Atlantic, brings the water of the tropical and warmer-temperate zones into higher latitudes. For since, as already pointed out (§§ 14, 15), the North Pacific must derive the deep stratum of glacial water which nearly fills its basin, from the Polar area of the *opposite* hemisphere, the flow of this stratum from the Equator northwards must have as its complement a movement of the superficial stratum from the northernmost limit of this flow *towards* the Equator, and thence towards the Southern Pole. However paradoxical it may seem to affirm that the *want* of communication between the North Pacific

and the Arctic basin makes the upper stratum of the North Pacific *colder* than that of the North Atlantic, I think I shall be able to show by a simple diagrammatic illustration, that such must really be the effect of this condition—free communication with the Antarctic area being maintained through the South Pacific.



30. If a long narrow trough filled with water have cold applied to its surface at the two ends representing the North and South Poles respectively, and surface-heat be applied to an intermediate portion representing the Equatorial zone, there will be a circulation in each half of the trough resembling that formerly described;* and while the cold water that is continually descending in the two Polar areas, and flowing along the ocean bottoms, will rise towards the surface under the Equator, the water there heated on the surface by solar radiation will carry a portion of that heat first into the temperate zones, and then towards the Poles. This illustration represents the condition of the North and South Atlantic basin; the principal modifying influences being (1) the limitation of the communication between the Arctic basin and the North Atlantic, and (2) the transmission of the larger proportion of the Equatorial current into the North Atlantic as the Gulf Stream. The effects of these influences in giving to the North Atlantic a higher temperature than that of the South Atlantic, have been already considered (§ 7).

31. The condition of the Pacific, on the other hand, may be represented by the following diagram:—



The effect of extreme cold being here exerted at only one end

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* 'The Gibraltar Current, &c.,' in 'Proceedings of the Royal Geographical Society,' January 9, 1871, p. 66.

(South Pole) of the trough, the water which it renders heavier will flow along its bottom to the opposite extremity, tending to rise towards the surface wherever the elevated temperature of the upper stratum diminishes its downward pressure; and this will, of course, be chiefly (though not exclusively) in the part of the trough lying under the Equator, where the strongest surface-heat is applied. But as the South Polar indraught carries the upper stratum from the Equator first towards the South Temperate, and then towards the South Pole, so its extension to the other end of the trough will draw the upper stratum from the North Temperate towards the Equator,—thus, by the reduction of level at the northern end of the trough, causing the glacial water of the bottom to rise towards the surface, so as to keep down the temperature of the upper stratum that is being drawn towards the Equator.

32. This is precisely what happens in the North Pacific, in which, as we have seen (Table, p. 505), the glacial water comes up as near the surface between 43° and 48° N., as it does even in the Southern Ocean in much higher latitudes; whilst a flow of North Temperate surface-water towards the Equator would account for the well-known moderation of the climate of the Sandwich Islands, though lying within the Tropic of Cancer.—It does not seem unlikely that the extraordinary coldness of the subsurface stratum of the North Pacific between the parallels of 30° and 52°, may be the cause of the absence of *Globigerine* deposit on the bottom; the observations made during the 'Challenger' Expedition having shown that during part, at least, of their lives, the *Globigerinæ* frequent the upper waters of the ocean.

33. *Depth and Bottom-contour of the North Pacific Basin.*—Besides the Temperature-results, of which I have now given a summary, the information obtained by the 'Tuscarora' respecting the depth and bottom-contour of the North Pacific basin, and also as to the nature of the bottom-deposit, appears to me especially worthy of the attention of Physical Geographers and Geologists.

34. Before commencing the survey of the lines marked out for the ocean telegraph cable, the 'Tuscarora' made a preliminary trip for the purpose of comparing the ordinary sounding-reel and hempen-line with the sounding-machine and piano-wire devised by Sir William Thomson. The latter having been judged superior, it was employed throughout the cruise, and the original sounding-reel was replaced by a duplicate Thomson's machine for obtaining serial temperatures. The corrosive effect of sea-water upon the steel wire was prevented by keeping the drum immersed, when not in use, in a solution of caustic soda; this, however, acts on the *solder* with which the lengths of wire are united, an occasional

renewal of which is consequently necessary. After the preliminary trials required for the complete mastery of the new method, the wire seems only to have broken twice (at 3045 and 2956 fathoms) out of 135 casts on the Southern route, and three times (at the enormous depths of 4643, 4411, and 4655 fathoms, § 42) out of 196 casts on the Northern.

35. Eight lines of soundings were run off and on shore, in the first instance, between Cape Flattery (Lat. 48° 20′ N.) and San Francisco (Lat. 37° 40′ N.), and eight more between San Francisco and San Diego (Lat. 32° 47′ N.). The sections thus obtained correspond with those which have been taken along the western shore of the European Continent, in showing that within a small distance from the present shore-line there is a very rapid descent of the bottom; the oceanic basin soon showing a depth that approaches 2000 fathoms, with steep sides. In some of these sections the rapid descent begins close to the present shore-line, while in others, the bottom slopes more gradually for from 20 to 60 miles (just as it does on the West Coast of Ireland), and then suddenly descends; an interruption being made in three instances by a terrace about 10 miles broad at a depth of about 500 fathoms, while off San Diego a steep ridge rises to within 203 fathoms of the surface at only about 40 miles from shore, though there is a depth of 1053 fathoms between.

36. Southern Route.—At about 150 miles from San Diego, which was selected as the starting-point of the Southern route, the depth proved to be 2117 fathoms; and from this point westwards, for nearly 1000 miles, the range of depth lies between 2049 and 3604 fathoms. From a point about half-way between San Diego and the Sandwich Islands, however, at which the depth is 2159 fathoms (Sect. VIII.), the basin deepens considerably to the westward, the bottom sinking rapidly to 2650 fathoms, and then, with slight undulation, to more than 3000 fathoms. At about 150 miles from Honolulu the bottom rises to 2488 fathoms, only to fall again, however, to 3023 fathoms very near the Sandwich Islands, which rise abruptly from this enormous depth.

37. Thus it is evident that this part of the Pacific is an enormous area of very great depression; and that an elevation of its bottom to an extent far exceeding the average elevation of the American Continent above the sea-level, would produce very little effect upon the present distribution of land and water in this part of the globe.

38. The declivity of the western slope of the Hawaiian elevation is scarcely less steep than that of the eastern. Within 50 miles the water deepens from 206 fathoms to 1468 and 1580 fathoms, and within 100 miles to 2418 miles; but the depth of the Asiatic half

of the North Pacific basin is by no means as uniform as that of the American half. At rather less than 800 miles to the westward of Honolulu the bottom rises to 1874 fathoms (A) from the surface, then rapidly falls to 3045 fathoms, continues more than 3000 fathoms deep for about 300 miles, and then gradually shallows, until, at about 1400 miles to the west of Honolulu, it rises to only 1108 fathoms (B) from the surface. Descending rapidly to 1817 fathoms, it again rises to 1613 fathoms, and in about 50 miles sinks to 2813 fathoms. Farther eastwards the depth increases to 3262 fathoms and continues nearly the same, until, at about 2275 miles from Honolulu, the bottom rises very abruptly from 3009 to 1400 fathoms (C), then falls again to 3023, and thence continues to present a series of abrupt alternations, between depressions exceeding 3000 fathoms in depth, and elevations (D, E, F, G) that approach within from 1500 to 2173 fathoms of the surface. The Bonin Islands (Lat. 26° 55′ N., Long. 142° 14′ E.), which lie nearly in the same parallel as the Hawaiian, to the south-east of Japan, rise almost as abruptly as they do from a great depth; while between these and Cape No Sima, Japan, a distance of about 450 miles, the bottom deepens again to 2435 fathoms.

39. *Nature of Bottom.*—The specimens of the bottom brought up in the first Section between San Diego and Honolulu, are almost invariably described as "yellowish-brown mud or ooze," with an occasional mixture of "fine particles of sand;" but in the shallow water around the Hawaiian islands, the bottom was found to consist of "whitish-grey sand," apparently disintegrated coral. The *deep* bottom to the westward again uniformly yielded "yellow-brown "ooze;" but at elevation A, the sounding apparatus brought up "white coral with lumps of lava;" on elevation B, a sounding at 1964 fathoms brought up "whitish cream-coloured ooze," at 1625 fathoms "coral mud," at 1108 fathoms "white coral," at 1817 fathoms again "white coral," at 1613 fathoms "white coral "and sand," and at 2813 "light yellow-brown ooze;" on elevation C, the bottom was "coral limestone and sand;" on elevation D, at depths of 2042 and 2173 fathoms, the bottom consisted of "coral "limestone with sand;" on elevation E, at a depth of 1499 fathoms, the bottom was "coral limestone with specks of lava;" on elevation F (1712 fathoms) the bottom was "coral limestone with par-"ticles of sand;" on elevation G (1700 fathoms), it was "coral "limestone with particles of lava;" and on both slopes of Peel Island (Bonin group) the sounding apparatus brought up from various depths "coral limestone" with "specks" or "lumps of "lava."

40. Considering these facts by the light of the general d

of Coral growths propounded by Darwin and confirmed by Dana, it seems scarcely to admit of question that the vast area of the North Pacific between the Sandwich Islands and Japan has been one of great and rapid subsidence within a very recent epoch. For it is impossible to account for the uniformity with which indications of coral presented themselves on every one of the elevations of this profile, unless we admit that each of these elevations had been—if not above the surface—yet sufficiently near to it to allow the reef-building corals to live; the limit of their depth being fixed by the two authorities just named at about 20 fathoms. And whilst in the Bermuda group, as in the other well known cases referred to by Mr. Darwin, the subsidence of the bottom has taken place so slowly that the growth of the corals has served to keep their living fabric up to the surface, the cessation of their growth on the series of seven elevations, whose existence the sounding-apparatus has disclosed in one section of the North Pacific, must be taken as indicating that the subsidence of this area took place too rapidly for their upward growth to keep pace with the downward depression. Now, if the summits of these elevations had been at or near the same level, it might have been maintained that the cessation of the growth of the coral which they supported might be accounted for by a *small rapid* subsidence, followed by a *larger slow* subsidence. But this would not be consistent with the fact that these elevations at present lie at depths of from 1400 to nearly 2200 fathoms; so that within this range, at any rate, the subsidence must have been sufficiently rapid to kill the coral borne by each elevation as it became submerged; and the same condition would seem, from the presence of dead coral at various depths on the slope of the Bonin Islands, to have continued to prevail.

41. It is well known that the Sandwich Islands constitute a focus of volcanic activity which is probably nowhere surpassed in scale; and, as the Bonin Islands are also volcanic, it would seem probable that the seven intermediate elevations—from some of which the sounding apparatus brought up "lumps" or "specks" of lava, along with coral—formerly constituted a chain of submarine volcanoes. It may reasonably be surmised that other lines of sounding would disclose the existence of a similar condition in other parts of the North Pacific; in which case the absence of those numerous coral islands which constitute so remarkable a feature of the Tropical and Southern portions of that vast oceanic area, may be attributed to the rapidity of its subsidence.

42. NORTHERN ROUTE.—Commencing from Yokohama (Japan) the survey of the alternative line for the projected submarine cable, the 'Tuscarora' in the first instance steered a N.E. course, on which

she met with a rapid increase of depth to 1425 fathoms, then with a terrace about 50 miles wide, and then with a steep descent to 3427 fathoms; and in a sounding taken 50 miles further (Lat. 38° 11′ N., Long. 144° 33′ E.), 4643 fathoms of wire were let out without striking bottom, and the wire then parted. As this extraordinary depth was considered unsuitable for cable-laying, the 'Tuscarora' was brought back to a position nearer land, and kept along a course nearly parallel to the shores of Niphon, Yesso, and the Kurile Islands. Here a similar terrace of much greater apparent breadth (probably because it was crossed more obliquely) was encountered, lying at between 1100 and 1425 fathoms' depth, and rising at its outer border to a sharp elevation of only 653 fathoms' depth; while on the outside of this the bottom fell rapidly to 2266, 3587, 4356, and finally to 4655 fathoms, at which last depth (obtained in Lat. 44° 55′ N., Long. 152° 26′ E.) the wire again broke, as it had previously done at a depth of 4411 fathoms. Thus it became clear that the bottom of this part of the Pacific lies at such a vast depth as to render it unsuitable for cable-laying, and that it would be necessary to follow a line still nearer the land. The ship was, therefore, again brought back to a position opposite the north point of Niphon, and her course so laid as to keep her at no great distance from the line of the Kurile Islands and the southern extremity of Kamschatka. Along this line, as might be expected, the depth proved very irregular, diminishing abruptly as islands were approached, and increasing rapidly at a short distance from the shore, until, at about 100 miles south of Cape Lopatka, the extreme point of the Kamschatkan peninsula, a depth of 3754 fathoms was struck. Between this and the first of the Aleutian Islands, at about 300 miles to the south of Behring's Island, the bottom rose gradually to within 1777 fathoms of the surface, and then sank again very rapidly to 4037 fathoms.

43. In consequence of this renewed indication of the extraordinary depth of this part of the North Pacific Basin, the course of the 'Tuscarora' was now laid still nearer the chain of the Aleutian Islands; in the first instance to the outside of it, and then, Behring's Sea being entered through the channel to the west of Tanaga Island, along the inside of the chain as far as Ounimak Strait, near the termination of the peninsula of Alaska, through which the 'Tuscarora' passed into the Pacific again. This chain of islands rises up from a sea which is extremely deep on its southern flank, and which, from the fact that depths of 1750 fathoms were obtained at a short distance within it, seems also to be very deep on its northern side.

44. The Pacific Basin, to the south of the Alaskan Peninsula, in Lat. 53° 35′ N., Long. 160° W., was found to have a depth of 3664 fathoms; but from this the bottom rose, at first rapidly and afterwards gradually, as the 'Tuscarora' kept her great-circle-course towards Vancouver's Island; more than 1000 miles of it sloping upwards, with very little interruption, from about 2500 to about 1500 fathoms. A sudden elevation to within 1007 fathoms of the surface (apparently a continuation of the ridge which forms Queen Charlotte's Island) then presents itself; and within this the bottom again deepens to more than 1300 fathoms, from which it rises rapidly, as in the other sections taken along the North American Coast, to within 100 fathoms of the surface. The contrast already shown in the southern section between the almost uniform basin-shaped bottom of the eastern half of the North Pacific, and the irregularity of its western half, in which extreme depressions alternate with elevations, is thus remarkably borne out by the northern.

45. *Nature of Bottom.*—The specimens of the bottom brought up by the sounding-apparatus are described as consisting of "yellowish "mud," "yellowish ooze," "clay-coloured mud," "clay-coloured "ooze," with grey and black sand of various degrees of fineness. At the greatest depths, mud or ooze generally predominated, but fine sand was often diffused through it; and in one instance the bottom, at 3439 fathoms, consisted of "hard yellow sand, with black specks." Along the whole of this route, except between the peninsula of Alaska and Cape Flattery, there was land at no great distance; and there is, therefore, no difficulty in supposing that both the mud and the sand were mainly derived from its disintegration. No indication is given of organic constituents; but I have reason to believe that a microscopic examination of these soundings would yield abundance of siliceous *exuviæ*.

The PRESIDENT said that it was upon such papers as that which Dr. Carpenter had prepared, that the scientific reputation of the Royal Geographical Society amongst Continental nations depended. If it was merely a society to register personal adventures, or the ordinary run of travellers, it might be a Geographical Society, but it would not be a scientific Geographical Society. When, however, serious problems of physical geography, such as Dr. Carpenter had solved, were considered, the Society fulfilled those functions for which it was really constituted. He expressed the hope that Dr. Carpenter would allow the paper to be printed in the Society's 'Journal,' for he knew it would tend to confirm the very high character which the Society had always held of its author.

The thanks of the Meeting were then voted to Mr. Forrest and to Dr. Carpenter for their papers, and to the Senate of the University of London for the use of the hall during the session now terminated.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Journey in the Interior of Formosa.* By Arthur Corner, Amoy.

During a recent visit to Formosa, with a view of making some notes and sketches of the country occupied by the Aborigines, I landed at the British settlement of Takao, lat. 22° 37′ N., long. 120° 16′ E., on the S.W. coast, intending to proceed eastward to the mountains extending (some 40 to 50 miles from the coast) in a northerly and southerly direction, and inhabited by the savage races.

The harbour of Takao is shallow, and the part where vessels lie is becoming daily more contracted, as the drift-sand fills up the lagoon and is carried out by the tide to the entrance. On passing the bar we enter the harbour by two heads, having a passage apparently not more than 30 yards wide. To the northward is a rocky bluff composed of limestone masses rising towards Ape's Hill, and the south point, called the Dragon's Head, is a high cliff of fossiliferous limestone, the strata of which would apparently lead to the conclusion that these beds have formed a continuous line with Ape's Hill. From a sketch of the cliff which I made from the bar, it is seen that the strata indicate two different periods, if not more, of terrestrial change, and from a fossil mollusk (Monotus Hawni) I picked up on the top of the cliff, it would appear upon reference to the very limited resources to which I here have access, to belong to the latter period or Permian period of Palæozoic times. Joining the Dragon's Head with the mainland, a long narrow spit of sand runs southerly for some 7 miles, separating the lagoon from the sea, and covered with banian and wild pine-apple, and cultivated with sweet potatoes. This bank is not, as one would imagine, of coralline formation, but appears to have been formed by the action of the sea, as I found no traces of recent coral growth on it; the lagoon also may have formerly extended inland for a much greater distance, perhaps to the foot of the range of slate hills to the eastward, some 40 miles, being gradually filled up by the drift-sand to its present limits. The sand of the river-beds which I have traversed in journeying towards the mountains, appeared to be composed of slate fragments, the stones being water-worn slate, rounded by marine action probably. A northerly breeze fills the air with a dense quantity of fine sand, so as on a clear day to entirely obscure the distant country. Ape's Hill is a mass of ancient coral limestone, and contains some curious caves and rifts, filled with shells and bones of fishes. I explored one of these for some distance, and found the vertebræ of a fish and other bones not fossilized.

A journey of two days nearly due east of Takao, over a country highly cultivated with rice and sugar, brought us to the village of Calipo, about four hours' walk from which, and after ascending the mountains for some distance by a very narrow and precipitous path, we reached the savage village of "Kao Siah," which my barometer showed to be about 1700 feet above the sea-level. The tribe occupying this position is called the "Soah ma hai" people, who are a fine type of the aboriginal race. Of middle height, broad-chested and muscular, with remarkably large feet and hands, the eyes large, forehead round, and not narrow or receding in many instances, nose broad, mouth large, and disfigured by betel. The women are pleasant-looking, and their children pretty; but the teeth of all are spoiled by betel. Their appearance and habits would lead one to imagine them to possess some connection with the Malayan race, although the dress and arms bear no resemblance. The men wear a kind of short cotton petticoat, and some have jackets of woollen material in stripes, red, green, and orange, but most have none; some are tattooed on breast and arms. They carry a spear from childhood, and a straight, short sword in a wooden scabbard open on one side; the sword is used for many pacific as well as warlike purposes, such as chopping wood, in which they use it very dexterously, and it seems to be their only implement for that purpose. The women wear a short jacket just covering the breast, with long, close sleeves, are bare round the waist to the band of the petticoat, which reaches to the calf of the leg; from knee to ankle cotton gaiters cover the leg, and the feet are bare. Their cloths are made of cotton of various shades of blue. The head-dress is generally a red turban twisted in with the hair, and a wreath of wild flowers or leaves, which when fresh has rather a picturesque effect. The men's head-dress is a black turban, the ends of which are spread out in a fanlike shape and embroidered. Some of the men wear a kind of leather scull-cap with a curtain behind covering the neck; the front of the cap is often ornamented with the teeth of wild animals arranged in a star-like form. There is a race which is said to be identical in origin with these mountaineers, who inhabit the plains, and are called the "Pe pa whan" by the Chinese, while the hill savages are called "Chè whan," or green savages; the former have many characteristics of the hill people, but are under the dominion of the Emperor of China.

The village of "Kao Siah" is built on the edge of a deep ravine facing the east and opposite a mountain of some 9000 feet, with the dry bed of a torrent in between, which in the rainy season must pour down a large body of water on the plains. There is no water on the site of the village, and supplies are brought from a place at some distance, which we passed in ascending, in large bamboos about 5 feet long, carried by the women. The place seems to be almost inaccessible from any point but that by which we approached it. There is a kind of stockade surrounding the village, and the houses are built in terraces of slate, of which the surrounding country is composed. The roofs are about 4 feet high, very low inclined, and the slates are kept in position by large stones along the ridge. The door is a slab of wood, about 3 feet high, sliding in a groove; and each house has one or two windows closed by wooden shutters, and a fire-place. The outside court is paved with slate, and slabs of the same, set up edgeways, separate one house from another. In front of each house is an erection of bamboo, thatched, and supported by wooden piles, with round slabs of slate interposed to prevent the access of rats and vermin to the grain stored within. The interior of the houses presented much the same features in every case. On entering the door a wooden partition separated a platform raised about a foot from the ground, on which the family slept; a row of large bamboos full of water rest against the wall, and a broad fire-place, with an iron cooking-pan of Chinese manufacture, constitute the savage *batterie de cuisine*. There is a kind of reed which, when dried, is used as a means of illumination both indoors and out.

These people are said to have a certain form of religion, and we noticed a curious custom before drinking, of putting their forefinger into the cup and throwing a few drops on the ground, but I have not been long enough among them to observe much on this subject. They are said to preserve the heads of their enemies, the Chinese, in certain houses in the village set apart for that purpose. I did not, however, see any. The place was remarkably clean and sweet, and, with the exception of the presence of the inevitable pig, bore strong contrast to a Chinese village of the same dimensions. The people are good-natured enough, although we were only two Europeans (myself and Dr. Krauel, German Consul at Amoy), our Chinese being too frightened to accompany us. From certain proposals which were made to us, it would appear that the social condition of the savages of Formosa is not encumbered with those prejudices regarding the moral obligations of married life which belong to some European nations.

One cannot fail to feel interested in these people, whose manners and appearance are so prepossessing; and it is distressing to contemplate that in the course of a few years they may probably be extinct. It is possible that, under different circumstances, these people might become as useful members of society as some of the African races I have seen, of whom these people in some particulars strangely remind me. The antipathy to the Chinese is so strong that warfare between them is constant; and the savage who fell into their hands, from the playful girl with laughing eyes, or boy who carries his light spear so gracefully, to the old man, would assuredly be decapitated if once in their power; and while this policy is pursued towards them the race cannot but yield to so numerous an enemy.

From the appearance of the slate at Kao Siah, I judge that if properly cut it would make capital building material, and the conveyance would not be very difficult, as country roads exist to the foot of the hills by which buffalo-carts bring down sugar-cane, and the rivers from some points would be available for boat navigation.

As to the bearing of travellers among savage people, there is little doubt that a free and even jocular manner is the safest, if we wish to disarm suspicion, always strong in the wild man. Regarding the carriage of water, I should think anything preferable to skin; the Formosa savages sometimes use bladders for this purpose, of which I had very disagreeable experience in the flavour of the water. Nothing, however, could be better than the large bamboo, as the slight evaporation through the pores would tend to keep the water cool.

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2. *Incidents of Travel in Papua-Koviay (New Guinea).*
By M. Mikluko Maklay.

[Translated and communicated by Colonel the Hon. W. Feilding.]

The following extract from a letter addressed to a lady in Russia by M. Nicholas Mikluko Maklay, has been translated by Colonel the Hon. William Feilding, at the request of that distinguished Russian ethnologist and traveller. The incidents therein narrated occurred during his stay in the south-western portion of New Guinea in the spring of 1873. Mr. Maklay had previously spent fifteen months on the eastern end of the island. More complete accounts of this, as well as of his first travels in New Guinea, have been published by the Imperial Geographical Society of Russia.

"Knowing the nomad habits of the population of Papua-Koviay, I took with me from my starting-place in Ceram Laut (an island south of the Molucca group) nineteen men from that island, as well as my Amboynese servant Joseph.

"To facilitate the construction of a hut, as a place of shelter for my baggage, I took also three hundred 'atapes' (broad palm-leaves sown together with fibre, used in the formation of the roof and sides).

"After visiting several islands on the coast, I selected at last a most picturesque spot on the mainland, called 'Aiva,' situated opposite an archipelago, called by the natives 'Mavara.' (This archipelago is not yet named or marked on any map.)

"My men built me a capital hut, around which a considerable number of Papuans of different tribes soon collected. Their prahus and mine, drawn up on the neighbouring beach, and a few huts hastily built for shelter, gave it quite the appearance of a native village, and thus offered me favourable opportunities for the pursuit of my ethnological studies, of the forms, customs, and habits of life of the native population. Almost daily I received visits from the three chiefs of the neighbouring tribes, and assurances of their good will, and of the satisfaction they experienced at my presence, which gave them an immunity from the attacks of their enemies. These chiefs were the rajahs of Aidouma, of Nainatoto, and of Mavara. Having made myself acquainted with the greater part of the population in the immediate vicinity of my little colony, I determined on making an excursion to a distant part of the coast.

"Leaving seven of my men at Aiva to take charge of my hut and baggage, I took the remainder in my ourembaïe (a prahu of Ceram), and cruised eastwards along the coast. After an absence of a fortnight, I returned to Aiva, and, to my surprise, learnt that an attack had been made on the tribe of Aidouma, who had established themselves near my hut, and that my baggage had been pillaged.

"It appears that my allies, the Papuans of Aidouma, trusting in the protection afforded them by my presence at Aiva, had neglected to take the usual precautions against a surprise. One dark, rainy morning, during the temporary absence of the chiefs and a part of the men, the remainder being asleep either on board their prahus or in their huts, a party of their enemies of the tribe of Telok-Bitcharon attacked the little colony. Well-armed, and with their faces painted black, they burst into the hut built for the Rajah Aidouma, which during his absence was occupied only by his wife and little child, a nice girl, of about six years of age. Although pierced by two spears, this unfortunate woman managed to reach my hut, where she expected to find protection. The other Papuans of Aiva following her example, my hut soon became the central object of attack. As, however, they could only muster about a dozen men, indifferently armed and without chiefs, and were encumbered with the presence of the women and children, this forlorn little band soon suffered defeat at the hands of their well-armed assailants, who exceeded one hundred in number. These latter, not content with having wounded ten of the tribe of Aidouma (men and women), first assured themselves that the wounds received by the rajah's wife were mortal, and then cut in pieces the little girl. Her head and one of her arms were afterwards fixed on a lance, and carried in triumph. Afterwards I learnt that the motives of these murders and atrocities arose from a vengeance of long standing against the old rajah. After the slaughter the pillage of my effects commenced, lasting till three in the afternoon. This done, some of the mountaineers retired towards their fastnesses, taking with them as slaves a boy and two young girls, together with as many of my things as they could carry.

"During the attack, in which my men took no part, one of them, who seems to have retained his presence of mind, embarked with two others in one of the prahus, and went on board a padonakan (a large sailing prahu), which had come from Macassar to engage in barter with the natives. He succeeded in persuading the captain to send a boat with some armed men to save some of my baggage. Arrived at Aiva towards evening, they found the natives of the tribes of Nainatoto and Mavara engaged in the distribution of the day's work. Tired, and seeing armed men, they retired, leaving my men and their escort to gather together and to transport to the padonakan the remnant of my effects.

"Although it was nightfall when I learnt this terrible news, I lost no time in shaping my course at once to the island of Nainatoto, near to which the padonakan was lying at anchor. There I found my men, who, having fled from the fight, had taken refuge on board. As the captain was afraid of an attack, he only waited until my arrival and the transhipment to my ourembaïe of my baggage, to hoist his matting sails and be off to the islands of Key and Arou. Personally, I had decided on returning to Aiva. My men, however, fearing a second attack on my return, wished to go back to Ceram, and I failed to induce them to obey my orders to return with me. Although I backed my order with threats of shooting them with my revolver, the most I could prevail on them to do was to land me and my baggage alone on the beach at Aiva. Arrived there, a new difficulty arose from the fact of the spring at Aiva having been poisoned by the enemy. This I fortunately discovered in time, by finding the fish in the little stream dead.

"Determined, however, not to quit this coast, I suggested to my men that we should search for another spot where to build another hut. The promise of a handsome remuneration turned the scale in my favour. I therefore stripped from my hut at Aiva the 'atapes' forming it, and, burning the remainder, I re-embarked with them and set sail. My course lay along the coast, and between it and the archipelago of Mavara. This lovely strait I have called 'The Strait of the Grand Duchess Helena of Russia,' in remembrance of my visit to Oranienbaum in 1870. Here I met the Rajah Aidouma, who had followed me with a few of his men in his prahu. Our meeting was a sad one; the poor old man cried aloud, reproaching me at first with being the cause of the death of his wife and child; but finally telling me that, having now no family, he wished to follow me everywhere.

"In New Guinea, as in many other parts of the Eastern Archipelago, it is the custom, after a murder, that the relatives of the murdered person should kill either the murderer, some of his tribe, or failing either of the former, then the first convenient person without any discrimination. This custom is founded on the idea that the person so killed will awake in their future state as the slave of their murdered friend or relative. My Ceram men, aware of this custom, made up their minds that this offer on the part of the rajah arose from his intention to kill me at a favourable opportunity if he should fail in killing some of the tribe who had murdered his family. They therefore begged me to beware; and I frequently remarked that they watched very narrowly every movement of the old man whenever he came near me. I was, however, very particular to avoid all appearance of uneasiness, and in no way changed my manner towards him.

"As I found no suitable place for my hut in or near the archipelago, which, moveover, belonged to my enemy, I decided at last on a spot beyond it, where was a hut formerly occupied by a rajah of Aidouma, to whom my present companion had succeeded as rajah. Near this hut was another, better built and ornamented. This I learnt was the grave of the former rajah, and the place was called 'Oumbourineta.' As there was a lovely view from it, with good water in some neighbouring tanks, and healthy from being well exposed to the sea breezes, I decided on building my hut here. On giving the orders to my men to land the 'atapes,' they all declared that not one of them would stay on shore, for fear of another attack. 'Very well,' said I, 'I will live by myself in the hut, and you may live on board the ourembaïe, or, if you like better, return to Ceram.' It ended by their constructing for me on the top of the cliff a hut of one small room with a verandah, whilst they worked on shore during the day, returning each night to sleep on board the ourembaïe. In a short time, as before, men of the tribe of Aidouma settled themselves round my hut; but the men of Mavara and Nainatoto, fearing my vengeance for their cowardly behaviour, did not show themselves.

"I soon found that the fears of my men were well founded; for I received information that the men of Nainatoto were preparing a fresh expedition. Hardly a night passed without some fresh alarm, and several Nainatoto men were on different occasions caught prowling at night round my new settlement. Although I was assured that they were spies, and was begged to kill them, I always ordered their release, declaring that when they brought the chiefs I would see justice done. Although the bad season was coming on, and my men were impatient to return to Ceram, I waited a whole month, intent on exacting punishment for the outrage done to my house by the murder of the wife and daughter of my ally under its very roof. This state of uncertainty was, however, brought to a climax on the 24th of April.

"It was daybreak, and my servant Joseph was getting ready my cup of coffee, whilst I was enjoying the lovely view spread out before me, the beauty of the varied outlines and foliage of Lammansieri vying with that of the other countless islands which closed in this grand tropical panorama. In the foreground were some of my men preparing their breakfast, whilst others were still asleep on the deck of the ourembaïe. A good many Papuans, recently arrived, were clustered in my more immediate neighbourhood. As Joseph poured out my coffee, he whispered mysteriously in my ear that he fancied that he had just espied the rajah of Mavara hidden in one of the prahus which had arrived during the night. I told him to go on board at once, and, on the pretext of buying some cocoa-nuts, assure himself whether or not Capitan[*] Mavara was there or not. After a short absence he returned with the information that his suspicion was correct.

"I determined at once to seize this traitor, and knowing well that I could not trust to the courage of my men of Ceram, I said nothing to them of the discovery I had made; but I took into my confidence one of the Papuans, Moï Birit by name, whom I had noticed as being more brave than the rest, and on my asking him if he would accompany me whilst making the arrest, he replied, 'Yes, if you go first.' Armed with my revolver, and accompanied by Moï Birit, to whom I had given a piece of strong cord, I told Joseph to remain in the hut, and to load my guns. Passing quietly amongst the groups of Papuans and men of Ceram scattered between my hut and the sea-beach, I reached at last the place where was drawn up the prahu in which Capitan Mavara was said to be concealed. Having summoned him three times by name to come out, but without any effect, I commenced to pull off the atapes with which the living part of the prahu was covered. I then discovered the rajah sitting on the deck, grasping his lance, evidently greatly astonished at seeing me. In an instant I was upon him, and seizing him by the throat with my left hand, placed the muzzle of my revolver against his teeth. At first he held out his arms as if to resist, but overcome by terror, his hands fell down along his side, and he trembled as if in a fit of ague. Leading him into the open, I called aloud to the crowd now assembled round the prahu, 'This is the Rajah Mavara, who caused murder to be committed in *my* hut at Aiva, and it is *I* now who take him as *my* prisoner.' The sight, however, of this man, now so abject and helpless in my hands, made me hesitate to press the trigger, and so to launch him into eternity. I contented myself, therefore, by desiring Moï Birit to secure him with the cord. Seeing this, my own men from Ceram rushed towards me, begging me to make haste, and to lose no time in embarking in my ourembaïe, pointing to the numbers of Papuans as compared to their own. 'We shall see,' I replied; 'but in the mean time I must be obeyed, and I order you to carry this man on board my ourembaïe.' Whilst they were thus occupied

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[*] The term "Capitan" means "Chief," and has evidently been borrowed either *from* the Portuguese or from the Dutch. It is also used by the Malays.

I turned towards the Papuans, who, although they held their arms ready for use, had remained silent spectators hitherto. As I approached them some slunk away and hid behind the bushes, whilst others remained standing where they were. Putting my revolvers back into my belt, I went towards them, saying, 'Have no fear, I do not mean to do any harm to *you*.' These words had an astonishing effect on the faces of my auditors, which became less anxious, some of them even welcoming me with a smile. I then addressed them as follows:—'I am not angry with *you*, but with the two rajahs of Mavara and of Nainatoto; and it is for this reason that I have made Capitan Mavara my prisoner. You must now lay down your weapons at my feet.' Some did so at once, whilst others only followed their example after having exchanged uneasy glances amongst themselves. 'Now, then,' said I, 'if you will help my people to embark my baggage on board the ourembaïe, I will give you some tobacco.' The natives complied readily with this request, as if glad to be relieved of my presence so easily. As, however, I did not know the number of the natives, nor what might be their intentions, I desired my two Amboynese to keep an eye on the prahus, and to have the guns in readiness. Above all, dispatch was necessary, lest my enemies should transmit to others the news of the arrest of the Rajah Mavara. In less than two hours, all my baggage being on board, I called the Papuans towards me, gave them the promised present of tobacco, and said to them: 'Go tell the wife and children of Capitan Mavara that I will not kill him, nor do him any injury. Seeing that they did not believe me, I added, raising my voice, 'Maklay says this, and furthermore, I give my hut and the atapes to the wife and children of Capitan Mavara. As to Rajah Nainatoto, I will come back another year and seize him.' I then took my departure towards my boat, escorted by two natives, to the astonishment of my crew, who, having begun to show signs of impatience, by no means expected so friendly a conclusion to so hazardous an adventure.

"Fearing that too long a delay might enable the natives to recover from their state of obedience and astonishment, I hoisted my matting sails, and towards mid-day was already at a considerable distance from the coast. Capitan Mavara was then untied, and food set before him, which he ate, and tried to make friends with some of my crew. I discovered afterwards that he promised that if they would assist him to escape he would give them plenty of the fruits and other products of New Guinea. To lessen the chances of escape, I shaped my course for Kilvaron. During the eight days occupied by this cruise, the water became bad, and I had on several occasions to draw my revolver in order to preserve discipline and to ensure obedience.

"Arrived at Kilvaron, I handed over my prisoner to the native Rajah of Kilvaron, to keep till the return of the Dutch Resident of Ambon, to whom on his arrival I gave full details of the attack by the prisoner as well as of his arrest. Sassi, Rajah or Capitan of Mavara, was first taken to Amboyna, and thence to Tidore, where he was confined in November, 1874."

PRIZE MEDALS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

REPORT FOR 1875,

AND

PROGRAMME FOR 1876.

SYNOPSIS OF RESULTS

OF

PAST EXAMINATIONS.

	Physical Geography.	Political Geography.
1869.	*Examiner*, A. R. Wallace.	*Examiner*, Rev. W. G. Clark.
	(*Special Subject: Palestine.*)	
Gold Medal	W. Grundy. (*Rossall.*)	H. C. Richmond. (*Liverpool College.*)
Bronze Medal	G. W. Gent. (*Rossall.*)	J. D. Wilde. (*Manchester Grammar School.*)
Honourably Mentioned	G. G. Butler, M. Stewart, A. Wilson, G. B. Brown, E. Thomas.	E. Crabb, J. H. Collins, M. L. Lewis, H. B. Dixon, D. S. Bontflower.
1870.	*Examiner*, A. R. Wallace.	*Examiner*, Very Rev. Dean Howson, D.D.
	(*Special Subject: India.*)	
Gold Medal	G. G. Butler. (*Liverpool College.*)	G. W. Gent. (*Rossall.*)
Bronze Medal	M. Stewart. (*Rossall.*)	J. H. Collins. (*Liverpool College.*)
Honourably Mentioned	W. Hind, G. Hughes, F. J. Beckly, F. W. Hunt, R. F. W. Shaw, E. C. Thomas.	E. Crabb, William Grundy, George Hogben, J. D. Murray, H. B. Dixon.
1871.	*Examiner*, Dr. W. B. Carpenter, F.R.S.	*Examiner*, C. H. Pearson, M.A.
	(*Special Subject: British North America.*)	
Gold Medal	D. McAlister. (*Liverpool Institute.*)	G. Hogben. (*University School, Nottingham.*)
Bronze Medal	W. G. Collingwood. (*Liverpool College.*)	R. N. Arkle. (*Liverpool College.*)
Honourably Mentioned	R. A. Lundie, W. N. Shaw, W. C. Hudson, F. J. Beckley, T. Disney, W. E. Evill, H. R. F. Brown, W. B. Ffooks.	F. M. Sparks, J. B. Heath, D. S. Bontflower, A. Hassall.
1872.	*Examiner*, H. W. Bates, F.L.S.	*Examiner*, T. W. Hinchliff, M.A.
	(*Special Subject: South America.*)	
Gold Medal	S. E. Spring-Rice. (*Eton College.*)	W. G. Collingwood. (*Liverpool College.*)
Bronze Medal	A. S. Butler. (Liverpool College.)	W. C. Graham. (Eton College.)
Honourably Mentioned	C. Penrose, E. Dickson, J. R. White, H. de V. Vane.	R. H. Sayle, W. L. Kingsford H. E. Dixon.

	Physical Geography.	Political Geography.
1873.	*Examiner*, Dr. J. D. Hooker, F.R.S. (*Special Subject: Eastern and Western Turkestan.*)	*Examiner*, Maj.-Gen. Sir H. C. Rawlinson, K.C.B.
Gold Medal	W. C. Hudson. (*Liverpool College.*)	S. E. Spring-Rice. (*Eton College.*)
Bronze Medal	W. A. Forbes. (*Winchester College.*)	A. T. Nutt. (*University College School.*)
Honourably Mentioned	A. C. Cole, R. C. Reade, H. H. Hancock, H. Louis, N. M. Richardson, G. S. Pawle, G. R. Townsend, W. S. Widdicombe.	A. Williams, W. L. Kingsford, G. H. Sing, S. H. B. Saunders, A. Hassall.
1874.	*Examiner*, Prof. A. C. Ramsay, LL.D. (*Special Subject: The British Isles.*)	*Examiner*, Rev. Canon Rawlinson, M.A.
Gold Medal	L. Weston. (*City of London School.*)	W. H. Turton. (*Clifton College.*)
Bronze Medal	F. C. Montague. (*University College School.*)	L. Jacob. (*City of London School.*)
Honourably Mentioned	H. M. Platnauer, W. S. Widdicombe, C. A. Spring-Rice, H. A. Miers, C. Healey, W. F. Wilson, A. R. Forsyth.	J. F. Heyes, S. H. B. Saunders, R. W. Whiston, W. B. Styer.
1875.	*Examiner*, General R. Strachey, R.E. (*Special Subject: China.*)	*Examiner*, Sir Rutherford Alcock, K.C.B.
Gold Medal	H. A. Miers. (*Eton College.*)	S. H. B. Saunders. (*Dulwich College.*)
Bronze Medal	A. E. Garrod. (*Marlborough College.*)	W. C. Graham. (*Eton College.*)
Honourably Mentioned	C. A. Spring-Rice, H. Perrin, H. H. Hancock, W. D. Thomson, H. M. Platnauer.	J. Vans Agnew, W. M. H. Milner, J. F. Heyes, D. G. Crawford, T. Knox, A. S. Moriarty.

PRIZE MEDALS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

INSTITUTED, 1869.

RESULTS OF THE EXAMINATION FOR 1875.

List of Schools who were invited to compete in 1875.

English Schools.—St. Peter's College, Radley, Abingdon; King Edward's School, Birmingham; Brighton College; Bristol Grammar School; Cathedral Grammar School, Chester; Cheltenham College; Clifton College; Dulwich College; Eton College; Haileybury College; Harrow; Hurstpierpoint; Liverpool College; Liverpool Institute; London,—Charter House; Christ's Hospital; City of London School; King's College School; St. Paul's; University College School; Westminster School; Royal Naval School, New Cross;—The College, Malvern; Manchester School; Marlborough College; University School, Nottingham; Repton; Rossall; Rugby; King's School, Sherborne; Shoreham; Shrewsbury; Stonyhurst College, Blackburn; The School, Tonbridge; Uppingham School; Wellington College; Winchester College.

Channel Islands School.—Victoria College, Jersey.

Scotch Schools.—Aberdeen Grammar School; Edinburgh Academy; Edinburgh High School; Glasgow High School.

Irish Schools.—Royal Academical Institute, Belfast; Dungannon Royal School; Ennis College; Portora Royal School, Enniskillen; Foyle College, Londonderry; Rathfarnham, St. Columba's College.

Twelve of the above Schools furnished competitors, according to the following list, in which is entered the number of candidates in Political and Physical Geography from each school:—

	Physical.	Political.
Victoria College, Jersey	1	0
Marlborough College	1	3
Brighton College	0	3
City of London School	4	0
Clifton College, Bristol	3	4
Grammar School, Bristol	1	0
Liverpool College	2	1
Haileybury College	0	1
Eton College	3	1
Dulwich College	3	1
Cheltenham College	0	4
Rossall School	1	1
Total	19	19

The Examiners appointed by the Council for 1875 were General R. Strachey, R.E., F.R.S., for Physical, and Sir Rutherford Alcock, K.C.B., for Political Geography. The examinations were held at the various schools, on the 15th of March, and the Prizes were presented at the Anniversary Meeting of the Society.

The special subject for the year 1875 was—

CHINA.

PHYSICAL GEOGRAPHY.

No. 1 Examination Paper, 1875.

General.

[*Candidates are not to answer more than* **Twelve** *Questions in this Paper.*]

(1). Have the outlines of land and sea, in the past ages of the earth, been greatly different from what they now are, and do they still change? Mention facts on which your opinion is formed, and state generally their causes as far as you are able.

(2). What is a *Volcano?* Mention some of the more remarkable phenomena connected with volcanic eruptions, and give examples of *active* and *extinct* volcanoes, mentioning elevations.

(3). What is a *Moraine?* What are the means of forming an opinion whether glaciers have existed at any particular place in past time, or have had greater extension there than at present?

(4). State the general phenomena of the *tides* of the ocean, and their causes. Under what conditions are the tides at certain places rendered very irregular, or much increased or diminished? What is a *bore?* How is it caused? and give illustrations.

(5). What are the characteristics of the climate of the Tropical zone, as *compared to* that of the Temperate zone? What is meant by an *insular* as *contrasted* with a *continental* climate, and what causes their difference?

(6). What are the hottest, and what the coldest parts of the earth's surface, so far as observations have extended? State the extreme temperatures in degrees of the Fahrenheit and Centigrade scales. Mention any remarkable facts you may know relating to areas of extreme temperature.

(7). What are the components of the *atmosphere?* What is the meaning of Barometric pressure? Is there any permanent, or nearly permanent variation of barometric pressure observed over neighbouring parts of the earth's surface, and, if so, how is it caused and what general effects does it produce?

(8). What is *rain?* Whence is the water derived which supplies it? Why is the quantity that falls in hot climates generally greater than that which falls in cold climates?

(9). What is a *cloud?* Why are clouds so commonly seen in the upper parts of the atmosphere? What is the cause of clouds frequently hanging on mountain tops?

(10). What is the cause of periodical seasons of rain? Give illustrations of periodical rains. Do mountains influence rainfall, and if so, how?

(11). What is meant by the *Magnetic Equator?* What by *Declination?* What by *Dip?* What by *Poles?* Is declination invariable at the same place or not? State any figures you remember as to amount of declination at any place, or as to the position of the Magnetic Poles or Equator.

(12). What are the main conditions on which the existence of organised creatures on the earth depend? Speaking generally, is life more abundant at the Equator than at the Poles, or *vice versâ*, and why?

(13). What is the meaning of the terms *Flora* and *Fauna?* In what manner does the flora at the foot of lofty mountains, like the Andes or Himalaya, differ from that found at greater elevations; and what are the more striking facts relating to the modifications of the forms of plants observed in ascending such mountains?

(14). The assemblages of living creatures found in two distant parts of the earth generally differ from one another, and those found in two neighbouring places generally resemble one another. What is supposed to be the cause of such differences and such resemblances? Are there exceptions to this rule, and, if so, how do they occur?

(15). The Fauna and Flora of Australia are very different from those of other parts of the earth; does the same remark apply to the indigenous races of man? and how are the marked differences accounted for? What are the peculiarities of the inhabitants of Papua and the Fiji Islands, and how are they explained?

(16). Make a sketch giving a sectional diagram of the surface from the West Coast of France to the Black Sea, and thence to the Bay of Bengal. Enter the names of a few of the more important places on the line, with approximate distances and elevations, the latter in *feet* and *metres*.

(17). Make a sketch map to indicate the general outline of the high lands of Asia Minor, Persia, Afghanistan, and Tibet, marking the positions of the Tigris and Euphrates, Sir, Amoo, Indus, Ganges, Brahmapootra, Hoang-ho, and Yangtze-Kiang.

(18). Draw a rough map from the following notes:—

Ship anchored opposite a small bay. Rowed on shore to W. point of bay, and ascended knoll at end of low line of hills which extends along the coast toward the N.W. Call the knoll (A). From it ship distant 6000 yards, bearing S.E. The opposite headland of bay (call it E) bears exactly E. From knoll look to the N. and E. across a valley with small stream, and hills beyond, on which note two peaks, one (call it C) bears due N., other (call it D) bears N.N.E. Head of bay bears N.E.

Walked along hills from A, moving N.W., and at 3000 yards observed peak (D) bearing N.E. On the left the coast was distant 1000 yards. Went on in same direction (N.W.) 3000 yards more, and came to point B, on the line of hill extending from A. B is top of cliff rising abruptly from sea. Beyond it coast-line goes off bearing W.N.W. At B observed bearing to peak (C) N.E. From B turned to right, and walked due E. 4250 yards, when I found myself with knoll (A) bearing due S., and peak (C) due N. Going on 1000 yards more, crossed the stream, which came down from the N.W. and flowed off into the sea on the bearing of the ship, which we saw about five miles off. Going on in the same direction 2000 yards more, peak (D) was seen to bear due N. Another 1250 yards brought us to the head of the bay, the ship now bearing nearly due S., and the E. headland of the bay (E) bearing S.E. The whole distance from (B) to the head of the bay had been 8500 yards. The bay from this point curved slightly round on either side to the headlands (A) and (E). The line of hills on which were peaks C and D ran round and ended in the headland (E).

NO. 2 EXAMINATION PAPER, 1875.

Special.

[*Candidates are not to answer more than* **Eight** *Questions in this Paper.*]

(1). What great mountains form the western boundary of China. If you were to travel *westward* from them could you go far at a great elevation? Say how far; and if you kept as high as possible, where would you at last be forced to descend to the sea-level?

(2). If you travelled *southward* from the same high mountains of Western China, keeping as high as possible, where would you come to the sea? What rivers would flow off to the east, and what to the west of your path?

(3). What are the chief peculiarities of the part of Central Asia under Chinese rule?

(4). Are the regions of Central Asia subject to China rainy or otherwise, and what causes any peculiarities in this respect?

(5). Mention two or three of the chief rivers of China. Give a rough sketch of their courses. What is a *river-basin?* and mark the basins in your sketch.

(6). Under what circumstances are rivers causes of the degradation of the surface of the earth; and when do they act in an opposite sense, and cause deposits? What part of China gives a remarkable illustration of one of these conditions, and what are the rivers concerned?

(7). Are there active volcanoes in or near China, and where? Mention other volcanoes of Eastern Asia, and say whether there is any supposed connection between them and those of the countries near China?

(8). Explain the terms *Trade Wind*, and Monsoon, and their causes. Are there monsoons in the seas of China, and within what local limits, and in what directions do they blow at different seasons of the year?

(9). What is a *Typhoon*, and does it differ from a *cyclone*? Are such winds known in China, and if so, where and when do they occur? In what direction do they travel? In what direction does the wind blow in a cyclone in China? is it the same as that observed in similar winds at the Mauritius, and if not, why?

(10). With the climate of what countries would you compare that of the southern half of China, and of what countries that of the northern half? How far south does snow fall in China at the sea-level? Compare the temperature, winter and summer, of a town in China, with one in Europe and another in America having nearly the same latitude, and offer any remarks on the differences, if there are any of importance.

(11). Mention any vegetable or animal products of China important in commerce, and say what you know of them, and whether similar products are obtained in other countries, and, if so, where?

(12). To what great section or family of the human race do the Chinese belong? What are their physical characteristics? Name two or three neighbouring countries in which the people are of entirely different families, and say what those other families are, and mention a few of their characteristics?

POLITICAL GEOGRAPHY.

No. 1 Examination Paper, 1875.

General.

[*Candidates are not to answer more than* **Twelve** *Questions in this Paper.*]

(1). What is meant by the latitude and longitude of places on the earth's surface? Describe the methods in use for ascertaining the latitude and longitude of places.

(2). Give the latitudes of (1.) North Cape, Europe; (2.) Cape Wrath; (3.) Land's End; (4.) Gibraltar; (5.) St. John's, Newfoundland; (6.) Toronto; (7.) Washington; (8.) San Francisco; and the longitudes, from Greenwich, of (1.) Berlin; (2.) St. Petersburg; (3.) Constantinople; (4.) Calcutta; (5.) Singapore; (6.) San Francisco; and (7.) Sydney, New South Wales.

(3). What is the relative size, speaking roughly, of Great Britain, Denmark, Sweden and Norway, and Belgium; of the Mississippi, Nile, and Danube; and of Mont Blanc and Mount Atlas?

(4). What is the distance, in geographical miles, and in a direct line, between the following places:—(1.) London and Teheran; (2.) Toronto and New Westminster, British Columbia; (3.) Khiva and Calcutta? (4.) Name the states and provinces traversed by such lines.

(5). What were the boundaries of the Russian Empire at the death of Peter the Great, and of Persia and Turkey at the same date?

(6). What would be the probable changes in maritime commerce produced by the opening of a ship-canal through the American Isthmus?

(7). Describe generally the influence of geographical features upon the distribution of races and political history of countries.

(8). Give in round numbers the population by the last census of the following countries:—(1.) Great Britain and Ireland; (2.) France; (3.) The German Empire; (4.) Austria; (5.) European Russia.

(9). Of what Ethnic elements is the population of Europe composed, and what is their geographical distribution?

(10). What changes in the boundaries of states were brought about by the European wars of 1866 and 1870?

(11). Name the chief colonies and foreign possessions of Denmark, Holland, France, and Spain; and give an account of the nature and amount of their population, products and commerce.

(12). Name the colonies of Great Britain, and state where situated, and their population.

(13). What were the chief commercial routes for distant trade, prior to the discovery of the Cape of Good Hope?

(14). What has been the alteration in commercial routes caused by the opening of the Suez Canal, and what its influence on shipping and trade?

(15). Give the areas, approximatively, in English square miles, of the following countries:—Great Britain, France, Russia in Europe, United States of America, and Brazil.

(16). Give the numerical proportions, in decimals, of the German geographical mile, the French kilometer, and the English statute mile.

(17). Enumerate in succession, from west to east, the countries lying between the same parallels of latitude as Spain, and give some general facts regarding their inhabitants and products.

(18). Compare the British Isles and Japan, as regards their area, geographical position, climate, products, and the social and political condition of their inhabitants.

No. 2 Examination Paper, 1875.

Special.

[*Candidates are not to answer more than* **Eight** *Questions in this Paper.*]

CHINA.

(1). What is the area of the Chinese *Empire?* Describe its boundaries.

(2). Describe the boundaries of China *Proper*. Name the provinces into which it is divided.

(3). Name its principal rivers. State their length, and how far have they been ascertained to be navigable from the sea by European ships?

(4). Describe the chief physical features of the country. Enumerate the principal products of China.

(5). What is the nature and value of its foreign trade? To what race do the Chinese belong? Whence came the Mahommedan element, and what is the nature and extent of the political influence exercised by Mahommedans throughout the Empire?

(6). What are the chief characteristics of the Chinese as a nation? What are the most salient points in their history?

(7). When did the empire of the Mongols terminate in China? What was the name of the Chinese dynasty which succeeded? How long did it last?

(8). When did the Manchoos seize upon the throne in China? Name the most celebrated and distinguished emperors of the Manchoo dynasty.

(9). What is the political constitution of China, and how is the country governed?

(10). When was the Treaty of Nanking signed? What were the immediate results of this treaty, political and commercial?

(11). What is the latitude and longitude of Peking, Nanking, and Canton?

(12). When was the Great Wall built, and by what Emperor? (2.) What was its object?

The following are the names of the successful competitors:—

PHYSICAL GEOGRAPHY.

		Age.	
Gold Medal	.. Henry Alexander Miers	16 ..	*Eton College.*
Bronze Medal	.. Archibald Edward Garrod	17 ..	*Marlborough College.*

Honourably Mentioned.

	Age.	
C. A. Spring-Rice	16	*Eton College.*
H. Perrin	16	*Clifton College.*
H. H. Hancock	17	*Bristol Grammar School.*

W. D. Thomson	17	*Clifton College.*
H. M. Platnauer	17½	*City of London School.*

POLITICAL GEOGRAPHY.

		Age.	
Gold Medal	.. Sidney H. B. Saunders ..	18 ..	*Dulwich College.*
Bronze Medal	.. William Coryton Graham	18 ..	*Eton College.*

Honourably Mentioned.

	Age.	
J. Vans Agnew	15½	*Marlborough College.*
W. M. H. Milner	15¼	*Marlborough College.*
J. F. Heyes	17	*Liverpool College.*
D. G. Crawford	17	*Cheltenham College.*
T. Knox	15½	*Haileybury College.*
A. S. Moriarty	17	*Brighton College.*

REPORTS OF THE EXAMINERS FOR 1875.

I.—PHYSICAL GEOGRAPHY.

To the Council of the Royal Geographical Society.

GENTLEMEN, LONDON, 16th April, 1875.

The number of candidates at the present Examination was nineteen, being one more than last year.

The result is as follows:—

1. **Gold Medal** .. HENRY ALEXANDER MIERS.
2. **Bronze Medal** .. ARCHIBALD EDWARD GARROD.

Honourably Mentioned.

CECIL ARTHUR SPRING-RICE.
HENRY PERRIN.
HUBERT HENRY HANCOCK.

WILLIAM DAVID THOMSON.
HENRY MAURICE PLATNAUER.

The Gold Medallist was the best in both papers. The Bronze Medallist was very near the Gold Medallist in the general paper, which was the most difficult. On the whole, the order in which the candidates appear above is very nearly the same as that in which they would have been placed if the papers had been dealt with separately, which confirms the general result come to.

The answers of the candidates not named were decidedly inferior to the others.

Considering the character of the papers, there is not any sensible difference between the value of the replies to the General and Special questions.

There is, however, a marked difference in the value of the answers to the several classes of questions: those that may be called Geographical being the best; next following those relating to climate, which are decidedly less well done; and last, those relating to Plants and Animals, which can only be characterized as indifferent. The Drawing is likewise generally poor, though one exception may be made, and the unsatisfactory result is perhaps partly due to the candidates having in very many cases avoided the questions which were intended to test this qualification. The handwriting of more than one of the candidates must be described as decidedly bad, and in one case it is so bad as to be hardly legible, and I think the papers should not have been received. The last named candidate is last but one on the General list as obtained from results of the two papers.

The answers show that there has been careful study on the part of most of the candidates; but I cannot avoid the remark that there are indications of the training in some cases having led to a cultivation of the memory, rather than to a sound apprehension of principles.

I am your obedient servant,

RICHARD STRACHEY.

II.—POLITICAL GEOGRAPHY.

To the Council of the Royal Geographical Society.

14, GREAT QUEEN STREET, WESTMINSTER,
April 19th, 1875.

GENTLEMEN,

I have to report that the papers of nineteen candidates for the prizes in Political Geography were placed in my hands with the following results:—

1. **Gold Medal** .. SIDNEY H. B. SAUNDERS.
2. **Bronze Medal** .. WILLIAM C. GRAHAM.

Honourably Mentioned.

JOHN VANS AGNEW.
WALTER M. H. MILNER.
JOHN P. HEYES.
DIROM G. CRAWFORD.
THOMAS KNOX.
ARTHUR MORIARTY.

I may observe that having no information as to the age of the several candidates, the decision rested on the estimate made of the merits of each paper, irrespective of all other considerations.

The two Medallists were so nearly equal that I had some difficulty in deciding. The difference in marks was in favour of Saunders; but the proportion was only as 750 to 710 in the General paper, and 315 to 265 in the Special. The amount of information possessed by each, and in both divisions, was very creditable, and showed close application.

With reference to the other papers, those of six of the candidates were decidedly superior to the rest, and deserving honourable mention. Between these and the remainder there was a considerable interval; but the papers as a whole showed application, and an intelligent appreciation of the leading facts referred to under each head.

The Special papers were generally satisfactory, and one of those among the candidates honourably mentioned (Moriarty) obtained a higher number of marks than either of the Medallists for their second paper (370); while two others not in that list, Hutchings and Kingsford, had respectively 365 and 305. It seems only necessary to add further, that I join in the recommendation made by Professor Rawlinson, my predecessor, as to the desirability of more exactness in the knowledge acquired, and the avoidance of any random use of figures. When these are not clearly remembered, they should only be given as approximate statements.

RUTHERFORD ALCOCK.

PROGRAMME FOR 1876.

THE Council of the Society have satisfaction in repeating the offer of Prize Medals for the ensuing year, and have invited the following Public Schools to take part in the competition:—

List of Schools invited to compete in 1876.

English Schools.—St. Peter's College, Radley, Abingdon; King Edward's School, Birmingham; Brighton College; Bristol Grammar School; Cathedral Grammar School, Chester; Cheltenham College; Clifton College; Dulwich College; Eton College; Haileybury College; Harrow; Hurstpierpoint; Liverpool College; Liverpool Institute; London,—Charter House; Christ's Hospital; City of London School; King's College School; St. Paul's; University College School; Westminster School; Royal Naval School, New Cross;—The College, Malvern; Manchester School; Marlborough College; University School, Nottingham; Repton; Rossall; Rugby; King's School, Sherborne; Shoreham; Shrewsbury; Stonyhurst College, Blackburn; The School, Tonbridge; Uppingham School; Wellington College; Winchester College.

Channel Islands School.—Victoria College, Jersey.

Scotch Schools.—Aberdeen Grammar School; Edinburgh Academy; Edinburgh High School; Glasgow High School; Glasgow Academy.

Irish Schools.—Royal Academical Institute, Belfast; Dungannon Royal School; Ennis College; Portora Royal School, Enniskillen; Foyle College, Londonderry; Rathfarnham, St. Columba's College; Rathmines School, Dublin.

Syllabus of Examinations for the Prize Medals of the ROYAL GEOGRAPHICAL SOCIETY *in* 1876.

EXAMINATION IN PHYSICAL GEOGRAPHY.

This Examination will take place simultaneously at the several invited Schools, according to printed regulations (which will be forwarded in due time), on the third Monday in March, 1876, and will consist of two papers of three hours each; the one to be answered between 9 and 12, 9½ and 12½, or 10 and 1 A.M. (according to the convenience of the School); and the other between 2 and 5, 2½ and 5½, or 3 and 6 P.M.

N.B. It is necessary, in order that Candidates may be admitted to the Examination, that their names be sent in to the Secretary of the Society on or before the *first* Monday in March.

No. 1 *Examination Paper* will consist of questions on the following subjects:—

A. *Configuration of the Earth*, as learnt by careful study of a globe. What are the distances, speaking roughly, between such remote places as may be specified? What places of importance lie on the direct lines between them, and what is the section along each? What are the relative size, elevation, &c., speaking roughly, of such well-known districts, mountains, and rivers, as may be specified?

B. *General Physical Geography.*—Distribution of land and sea, forests, plateaux, glaciers, volcanoes, man, animals, plants and minerals; climates and seasons; oceanic, meteorological and magnetic phenomena.

⁂ Extra marks will be allowed for sketches, but only so far as they are effective illustrations of what cannot otherwise be easily expressed. The use of blue and red pencils is permitted for this purpose. No marks will be given for neatness of execution, apart from accuracy.

The candidates may be required to construct a rough map without the aid of special instruments, but from a brief description of a district illustrated by itineraries and bearings.

No. 2 *Examination Paper* will consist wholly of questions on a special subject.

The special subject appointed for 1876 is—

THE ARCTIC REGIONS (INCLUDING ICELAND AND THE WHOLE OF GREENLAND).

EXAMINATION IN POLITICAL GEOGRAPHY.

This Examination will take place simultaneously at the several invited Schools, at the same hours and under precisely the same regulations as those in Physical Geography.

No. 1 *Examination Paper* will consist of questions on the following subjects:—

A. *Descriptive Geography.*—Explanation of latitude and longitude. What are the distances in geographical miles, speaking roughly, and as learnt by the careful study of a globe, between such remote places as may be specified? What places of importance lie on the direct line between them? What is the relative size, speaking roughly, of such well-known countries, mountains, and rivers, as may be specified?

B. *Historical Geography.*—Embracing (1) the boundaries of states and empires at different historical periods; (2) the chief lines of commerce, ancient and modern; (3) the influence of geographical features and conditions upon the distribution of races and political history of mankind.

No. 2 *Examination Paper* will consist wholly of questions on a special subject.

The special subject appointed for 1876 is—

THE ARCTIC REGIONS (INCLUDING ICELAND AND THE WHOLE OF GREENLAND).

Candidates will be expected to be acquainted with the History of Arctic Discovery.

⁂ Extra marks will be allowed for maps and sketches, but only so far as they are effective illustrations of what cannot otherwise be easily expressed. The use of blue and red pencils is permitted for this purpose. No marks will be given for neatness of execution, apart from accuracy.

The candidates may be required to construct a rough map without the aid of special instruments, but from a brief description of a district illustrated by itineraries and bearings.

The following books contain much information regarding the Physical and Historical Geography of the Arctic Regions:—

1. 'Chronological History of Voyages into the Arctic Regions,' and 'Voyages of Discovery and Research.' By Sir John Barrow. 1818 and 1846.

2. 'The Threshold of the Unknown Region.' By C. R. Markham. 3rd Edition. 1875. London: Sampson Low and Co.

3. '*A Selection* of Papers on Arctic Geography and Ethnology;' published *by the Royal* Geographical Society. 1875.

4. 'Account of the Arctic Regions (Edinburgh, 1820) and Voyage to the Northern Whale Fishery' (Edinburgh, 1823). By W. Scoresby.

5. 'Polar Regions,' reprinted from the 'Ency. Brit.,' 1859. By Sir John Richardson.

6. 'Voyages of Nicolo and Antonio Zeno.' By R. H. Major. Hakluyt Society, 1873.

7. 'History of Iceland.' By John Hogg. London, 1859.

Also the Narratives of Parry, Franklin, Back, Ross, Wrangell (Sabine's Edition. London, 1844), Mackenzie, Seemann ('Voyage of the *Herald*'), Kane. Parliamentary Papers relative to Arctic Expeditions, 1848 to 1856, &c.

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was at once answered by the Government the Antarctic Regions an expedition of two vessels, under that great navigator Sir James Clarke Ross, eclipsed as to the importance of its results and British Navy. I do not know the views held in that to us outsiders the achievements and work of a Ross or Livingstone have done more for the presti a march to Cumassi, that cost millions of poun explorer, Livingstone, is no more; his work is go finished by German and American explorers. We s the Arctic work rest till it is fully accomplished; bu Britain now to step in and once more to take the lea

"I have the honour to be,

"Your very obedien

"AUGUSTUS P

"Honorary Corresponding
"of the Royal G

"*Gotha, 7th November*, 1874."